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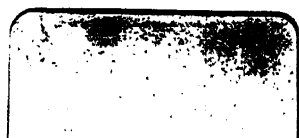
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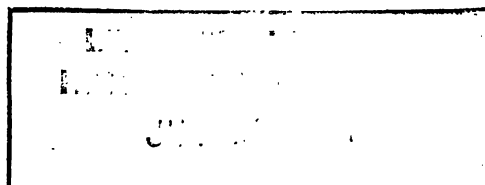
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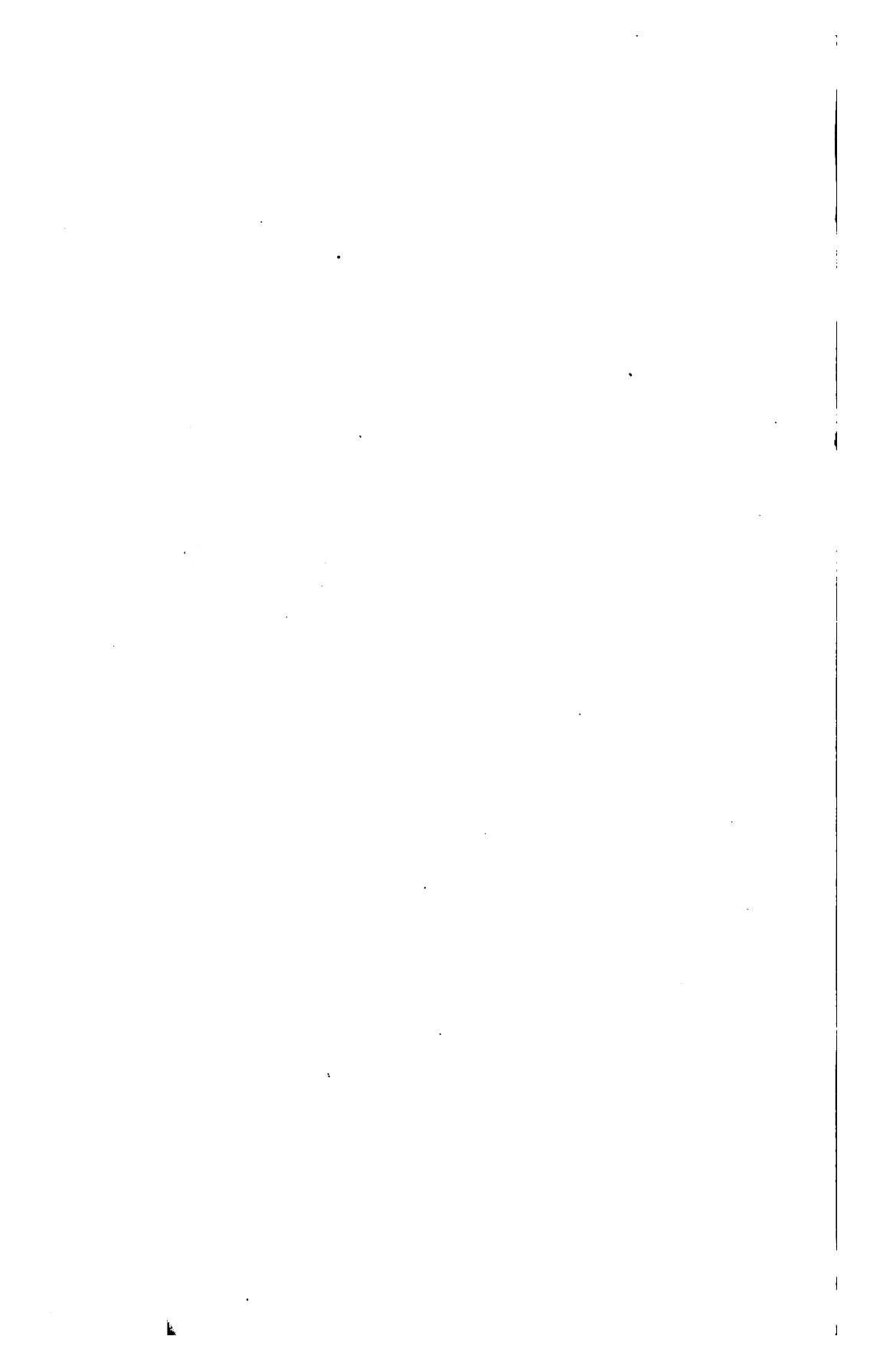
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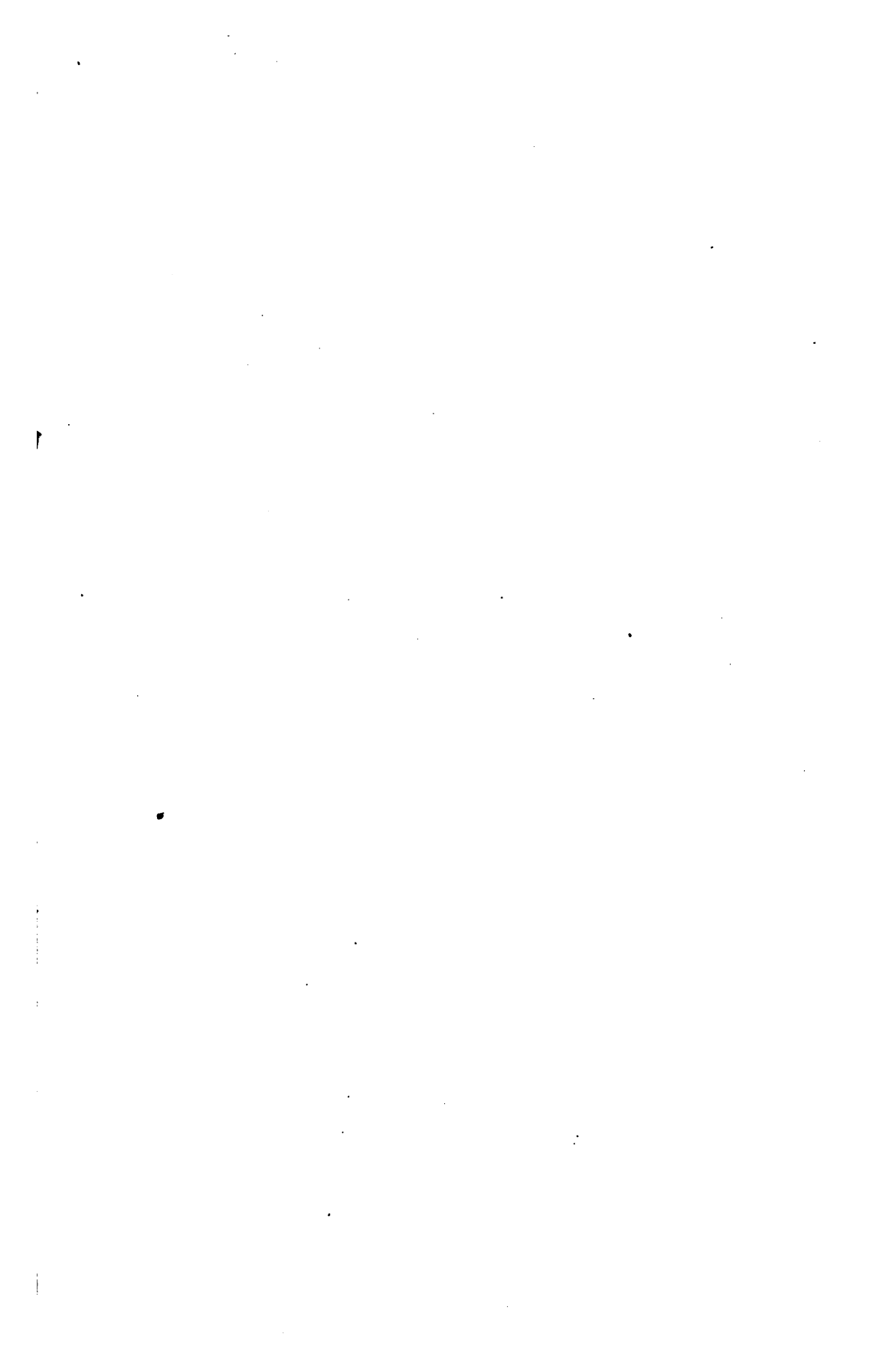
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STATE
DOG







Glen

TWELFTH REPORT

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF MAINE

FOR THE

Two Years Ending December 31, 1901.

1900-1901.

AUGUSTA
KENNEBEC JOURNAL PRINT
1902

STATE BOARD OF HEALTH OF MAINE.

OFFICE OF THE SECRETARY,

AUGUSTA, ME., October 3, 1902.

*To His Excellency, John F. Hill, Governor, and the Honorable
Executive Council:*

GENTLEMEN:—I have the honor of submitting to you the Twelfth Report of the State Board of Health of Maine, it being the fifth biennial report and for the years 1900 and 1901.

Very respectfully,

A. G. YOUNG, M. D., *Secretary.*

MEMBERS OF THE BOARD—1900-1901.

CHARLES D. SMITH, M. D., <i>President</i> ,	Portland.
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M. C. WEDGWOOD, M. D.,	Lewiston.
A. G. YOUNG, M. D., <i>Secretary</i> ,	Augusta.

CONTENTS.

	PAGE
Note of Transmittal	III
Membership of the Board.....	IV
Contents	V
Introductory	IX
Secretary's Report	I
Members of the Board and Standing Committees.....	I
Smallpox 1901	7
Subjects of Correspondence.....	35
Enquiries about Laboratory Work.....	35
Powers and Duties of Local Boards of Health.....	38
Destruction of Property	43
Quarantine	45
Nuisances	48
Disinfection	54
Tuberculosis and Sanatorium Treatment.....	62
Smallpox and Vaccination.....	67
Diphtheria	71
Scarlet Fever	76
Typhoid Fever	82
Measles	85
Whooping Cough	87
Chickenpox	87
Diseases of Animals.....	88
Water and Water Supplies.....	91
Food Supplies	92
Disinterment	92
Public Health Duties of Postmasters.....	93
New Circulars	95
Water Analysis	103
Additions to the Library.....	107
Reports of Local Boards of Health.....	115
Special Papers	179
Infant Feeding. By A. G. Young, M. D., Secretary of the Board	181
Artificial Feeding	181
Disadvantages and Dangers in Feeding Cow's Milk..	182
Cow's Milk vs. Breast Milk.....	185

Special Papers :	PAGE
Milk Modification	186
Proteids	186
Albumin	188
Fat	189
Sugar	189
Mineral Matter	192
Alkalinity	193
Lime Water	194
Raw Milk vs. Heated Milk	194
Pasteurization	198
Method of Pasteurizing	300
Diluent—The Cereal Question	201
Percentage Feeding	205
Home Modification	206
Household Care of Milk	215
How to Remove the Top Milk	215
Mixing Baby's Food	215
Feeding	217
Care of Utensils	217
Bottles	217
Nipples	218
Quantity of Food	218
Weighing the Baby	219
Special Mixtures	220
Whey and Whey Mixtures	221
Dextrinized Gruel	224
Albumin Water	225
Peptonized Milk	227
Condensed Milk	228
Patent Infant Foods	231
The Significance of Some Symptoms	232
Dietetic Treatment of Sick Babies	233
Mixed Feeding	240
Improvement of the Mother's Milk	244
Weaning	247
Diet after Weaning	248
Milk Laboratories	253
Other Special Preparations	253
Infant Feeding, Part II.—Production of Milk for Infant	
Feeding	256
Breeds of Cows	256
Feed and Care of Cows	256
Diseases of Cows	259
Gargety Cows	260
Colostrum	261
Ovulation	262
Spayed Cows	264
Bacteria in Milk	265

CONTENTS.

vii

Special Papers:	PAGE
Sources of Bacterial Infection and Its Dangers.....	266
Stables and Stalls.....	266
The Cow	267
The Milker and the Milking.....	267
Utensils and the Care of Them.....	269
Straining	270
Aeration	270
Cooling	271
Bottles or Cans?	271
A Model Dairy.....	272
Certified Milk	274
The Extra Cost of Sanitary Milk.....	279
Some Observations in Regard to Smallpox. By F. H.	
Dillingham, M. D.	281
Index	301

INTRODUCTORY.

The tardy appearance of this report is due to the fact that the danger from smallpox has constantly threatened our State and that outbreaks of that disease have been quite frequent thus necessitating the absence of the secretary from the office much of the time and increasing the office work very much. During the latter of the two years covered by this report there were an unusual number of outbreaks, but in the year 1902, not included in this report, much more frequent and serious outbreaks occurred and the time available for the preparation of the report has been exceedingly fragmentary.

Subjects of Correspondence.—In preparing the reports of this board it has been the policy of the secretary to occupy as little space as possible with the general correspondence of the office or in recording events which are merely of local or passing interest. Appeals are, however, frequently made to the secretary by local boards of health or by citizens for advice on matters of very diverse character. Some of the questions thus presented are of general interest, as is shown by their repetition by different correspondents. A new feature has therefore been introduced into this report, "Subjects of Correspondence" in which the answers to many inquiries have been classified under different headings.

One class of these questions is purely legal. The answers to some of them are explicitly defined in the provisions of the public health laws, while under the contingencies indicated in other letters the absence of any clearly defined statutory provisions or of precedents or legal decisions in our State render a positive opinion impossible.

Another class of questions relates to the best and most efficient methods of doing public health work, or often what is the best or most expedient thing to do under the particular circumstances.

A wide experience with work of this kind facilitates the answering of these questions or the doing of the work, but does not necessarily ensure the doing of it in the most efficient manner practicable. For instance, basing the work of disinfection on a mere assumption that a given disinfecting agent used for a given purpose in a given way frees articles from infection is not scientific work. It may or it may not produce efficient results. The only positive answer to such questions can be based only on the results of the repeated subjection of infection to the action of the given disinfectant under conditions similar to those met in the actual work of disinfecting rooms, clothing, and other articles, and then determining by the modern laboratory methods whether the vitality of the infective agent has been destroyed. The experimental work already done in the laboratories of the world enables us to generalize and to answer many of these questions with a considerable degree of positiveness, but much more work remains to be done.

In another class of cases, subjects of frequent inquiry, generalization is risky and may be costly. A local board of health inquires how long a person who has had diphtheria should be quarantined. We may answer four weeks, but in laying down a fixed rule to be applied to all cases, we beg the indulgence of the health officers in our neighboring states who have graduated from that antiquated method, and who now determine bacteriologically for each individual case whether the germ of diphtheria remains in the throat ten days or thirty days.

State Laboratory of Hygiene.—Much of the work of State and local boards of health, if well and intelligently done, must be based upon the answers which the laboratory alone can give to frequently recurring questions. Is this case one of diphtheria, or tuberculosis, or typhoid fever, or malaria, or glanders, or plague? is very often a question for the microscopically aided eye of the bacteriologist, and for him alone to decide. Without laboratory help the physician, no matter how wide his clinical experience may have been, is often unable to make a positive diagnosis, and how disastrous may be the results of an error or a disagreement in diagnosis, various local boards of health have had occasion to report to this office during the past year. In the absence of a public health laboratory the frequent urgent appeals for help from citizens, local boards of health, and physi-

cians must continue to receive the answer that the State board of health has no facilities whatever for laboratory work either chemical or bacteriological and regrets that it can not render aid. Whether the well or aqueduct which furnishes the domestic water supply is the source of lead poisoning suspected by the attending physician, or is probably the source of typhoidal infection, or in what disproportion as compared with other states which have laboratory safeguards, our State is receiving and consuming adulterated food products, or whether in the interests of the public safety a longer continued quarantine of a diphtheria patient, or cautionary instruction to a typhoid patient is required, cannot be answered. In the opinion of the State board of health this condition of things is not only unsafe, but is uneconomical, and is not creditable to the State of Maine. It is the sentiment of many private citizens who understand the situation as well as of those classes of persons entrusted with the preservation of the public health and the cure of disease that we *must* have a laboratory of hygiene.

Infant Feeding.—Among the leading causes of death are those disorders of the digestive system in infants which are due to faulty methods of feeding. The State board has for some time felt that mothers and all other persons who have the care of young children should have trustworthy leaflets at hand on the subject of infant feeding. The special paper in this report may be considered as an effort to present the latest and most trustworthy conclusions on the various points relating to infant feeding and which may serve as the basis of circulars for more general distribution.

Tuberculosis.—In what degree we may escape the payment of that fearful tribute which tuberculosis has long levied upon the human race will depend upon how far we, as a people, can appreciate the significant truths that tuberculosis is not hereditary, that it is spread or propagated by infection, and that, its true nature recognized somewhat early, it is eminently curable. The most important rules for its prevention are not by any means so difficult a task to learn as that of the mastery of the rudiments of the three R's which we place before our children. Aside from the hereditary apathy engendered by generations of suffering from this chief of scourges, there is no reason why the State of Maine may not save a large proportion of the one

thousand or more lives still sacrificed to tuberculosis, and at the same time save annually to the State a good part of the one or two million dollars lost with these lives, or spent in unintelligent and futile efforts to save them. In this work the State board of health and the Maine State Sanatorium Association invites every citizen and every former son and daughter of Maine to lend a hand. Money is needed to give temporary aid to the worthy or unfortunate poor who are the subjects of tuberculous infection, and in a humbler way he who cannot spare money may aid in seeing that every family in which a case of consumption occurs may not remain without warning of the danger which threatens other members of the household and of the means of obviating the danger.

Typhoid Fever.—Though there is no reason to doubt the correctness of the teaching that the cause of extensive outbreaks of typhoid fever is almost always to be sought in a water supply which receives sewage or in milk from a dairy where typhoid exists, there still appears to be need enough of cautioning local boards of health and the general public that not all cases of typhoid are thus caused. Once brought into a household, it may spread otherwise, and particularly through the medium of infected clothing, bedding, and the carpets and floors of the typhoid sick-rooms. Extreme cleanliness in the sick-room and trustworthy disinfection of the infected room and all that comes from it are urgently needed. The work done in this direction particularly in the disinfection of the typhoid dejecta if done at all, is generally done in altogether too slipshod and perfunctory a manner. The methods of carrying out these precautionary measures have been fairly well worked out scientifically and are given in Circular 46, which should be put into the hands of every family in which a case of typhoid fever exists. For the want of printed directions in regard to what should be done and how it should be done when typhoid fever is present in a household, many secondary and unnecessary cases undoubtedly occur every year.

Smallpox.—In dealing with the present epidemic of smallpox a serious difficulty arises from the fact that the true nature of the disease so frequently remains unrecognized until the infection becomes more or less widely diffused. In most of the cases which have appeared in this State, both the clinical history and the characteristics of the eruption are typical of smallpox in the

mild form. A few cases, however, are so atypical that there is great difficulty in arriving at a correct diagnosis, and in these cases it is thought that the paper of Dr. Dillingham may be helpful.

The State of Maine is peculiarly exposed to the danger from smallpox. On our north, on both sides of the St. John River, is a population, but few of the persons in which have ever been vaccinated. The nightmare of smallpox in this region has hung over the State board of health since its establishment in 1885. By good luck, and by the prompt action of the board or its medical inspectors or the local boards, smallpox has hitherto gained no foot-hold there. In the lumber regions of the northwestern part of the State it is sheer good luck that, before this winter, smallpox has never been introduced into the camps. In some of the western states, outbreaks of smallpox in the lumber camps have resulted in serious disaster to the lumber interests. The possibility of a like result for the operators in this State can be averted only by requiring the vaccination of all men before they are hired to go into the camps or to go on the drive. The general vaccination of the men before they are hired is practicable only through a statutory requirement and yearly seasonable notification of this requirement to provincial woodsmen as well as to those within the State. During the first three years following the organization of the State board of health in 1885, several outbreaks of smallpox occurred in paper mills using rags. A law was then enacted requiring the vaccination of all persons working in these mills. Since then, not a single case of smallpox has originated in these mills. Nothing but a similar requirement will be likely to save the lumbermen from loss and save the State the heavy cost of caring for smallpox outbreaks in the unorganized townships in the State.

Vaccination.—The whole responsibility for the prevalence of smallpox in any place rests upon unvaccinated persons. The general rule is that the person who has had smallpox once will never have it again. There are infrequent exceptions to that rule. No more frequent are the instances in which vaccination fails to offer absolute protection against smallpox in any, even the mildest form. To insure this absolute protection, more than a single vaccination may be necessary. If previously vaccinated and then revaccinated not too long before exposure, immunity

thus conferred against smallpox is undoubtedly as complete as it would be if a person had experienced an attack of smallpox. This fact is set forth in Circular No. 27, and is sufficiently shown in the experience of those who have had the most to do with the management of outbreaks of smallpox, and notably in the experience of men who have had charge of smallpox hospitals.

Dr. Wm. M. Welch, physician-in-charge of the Hospital for Contagious and Infectious Diseases, Philadelphia, says.*

"In every epidemic of smallpox that has occurred in Philadelphia within the past 30 years, instances have been observed of whole families being removed to the hospital because of an outbreak of the disease in these families. In such instances the unvaccinated children have suffered and often perished, while those who were vaccinated remained perfectly exempt, although living, eating and sleeping in the infected atmosphere for several weeks. But I have yet to see a single unvaccinated child escape the disease under similar conditions of exposure. Furthermore, I have more than once seen a vaccinated infant take its daily supply of nourishment from the breast of its mother who was suffering from varioloid and the infant continue as free from smallpox as if the disease were 100 miles away and the food derived from the most wholesome source. This is evidence of the prophylactic power of vaccination that does not appear in mortality reports nor in statistic records.

"In the early fall of last year smallpox broke out in a certain family, and the entire household, including father, mother and six children, were admitted to the hospital. The parents were vaccinated in infancy, but as the protection had become somewhat diminished through the lapse of time, they both suffered from a mild attack of varioloid. Their four youngest children were unvaccinated and they all had unmodified smallpox. Two children had arrived at the school age, one four years and the other two years ago, but before they could be admitted to school vaccination was necessary. Each child showed a good scar. These children remained in the hospital three or four weeks, being in daily contact with the worst cases of smallpox, and at the end of that time returned to their home without having shown any symptoms whatever of the disease. The father, like an honest man, said: 'I have never believed in vaccination before,

* American Medicine, IV, 52. 1902.

but am now convinced of its efficacy, and when I return home I shall preach it to my friends.' I might add that this man is not the only antivaccinationist who has left the hospital fully converted. This institution would be indeed a dangerous place for the president of the Antivaccination League to visit if he did not wish to lose his office.

"Three white children were brought to the hospital with their mother, who had smallpox. They were not ill, but sent in because they had already been exposed, and also because there was no one left at home to care for them. These children were, respectively, 7, 5 and 4 years old. Each had been vaccinated exactly three years and seven months before, and each showed a good scar. Immunity to smallpox was proved by their residing in the hospital for three weeks free from the disease.

"Similar evidence of the prophylactic power of vaccination has come to my notice repeatedly, both inside and outside the hospital. Very frequently indeed have I been told by patients that their older children who had to be vaccinated before they could get into school were left at home perfectly free from smallpox, while the younger ones, being unprotected, were brought in with the disease. Oh, how often have I seen such parents, after losing a loved one, grievously mourn and refuse to be comforted because of the consciousness of having neglected a most important duty!

"Since the present epidemic began, about 125 persons, including physicians, nurses, ward maids, cooks, laundresses, and the like, have been continuously exposed to smallpox in the hospital, and not one has fallen with the disease. I should perhaps mention the case of an employe who worked in the disinfecting plant which is located on the grounds. It was his business to handle infected clothing and bedding. He soon became dissatisfied with this work and removed to the interior of the State. When he had been there but a few days, I am informed, he took smallpox. This man had been vaccinated in infancy, but declined to be revaccinated.

"All those employed in the smallpox pavilion, except two or three who had the disease at an early period of life, owe their immunity to vaccination. Previously to assigning them to duty each person is carefully vaccinated, even though the vaccination of infancy and a subsequent revaccination may show evidence of

having been successful. With this care I have never seen a resident physician or nurse take smallpox. I do not hesitate to say that after a recent successful vaccination an individual can dwell in an atmosphere surcharged with the most virulent variolous poison, and live and breathe and eat and sleep there in safety."

Our Public Health Laws.—Our public health laws provide for a sanitary organization which, at home and elsewhere, is considered creditable to the State. In some directions, however, as compared with the sanitary codes in other states, our laws are defective. Those persons who have legal obligations imposed upon them as citizens or as health officers are often in doubt for the reason that their powers and duties are not clearly enough defined. In a few directions enactments are needed to deter the vicious or the careless from endangering individuals and communities. The State board has however deemed it best that the shortcomings found in the practical administration of our existing laws shall serve as indications of the need of additional legislation, or amendments to our present laws.

Vital Statistics.—A full and complete registration of births, marriages, and deaths is from many points of view an important matter. The records of births, marriages, and deaths are in many cases of great service to our courts of justice. Before these courts there frequently come the questions of heritage, and the legitimacy or illegitimacy of children. In the absence of official records of these events, attorneys and citizens have sometimes incurred great expense in searching for records. In the settling of pension claims, a similar use of vital statistics is made in those states where a comprehensive system of the registration of vital statistics has been carried on long enough. These records are also frequently needed to determine the questions of citizenship and the legal right of suffrage. The omission of a physician or a parent to report a birth to the town or city clerk may, and sometimes has been the cause of irreparable mischief.

From the public health point of view, a correct registration of vital statistics is in civilized countries generally considered essential. They serve as a sort of mariner's compass to tell us which way we are sailing and how the birth-rate, the marriage-rate, and the general death-rate, as well as the death-rate from special causes, compare with those in other states. In former years letters received in the office of the secretary of the State board

of health from some of the leading life insurance companies in the country indicated a belief on their part that the mortality from pulmonary diseases, and particularly from pulmonary tuberculosis in the State of Maine, was excessive. Our system of registration of vital statistics has, however, shown that in this respect the State of Maine compares favorably with any other state and that the death-rate from pulmonary consumption has materially diminished since our system of registration of deaths was begun in 1892.

The records of births, marriages, and deaths from the year 1892 on, are now arranged alphabetically in a cabinet in the office of the secretary of the State board of health, who is *ex officio* State registrar, and these records may be consulted at any time during office hours by any person who has occasion to refer to them, under the rules required for their safe keeping.

Routine Office Work.—While the State board has executive authority under certain contingencies, its steady routine work in an advisory capacity and in unifying the public health work of the State is perhaps its most important function. The instructions of the board, so far as they may be generalized, are sent out in its printed circulars and blanks, and through the pages of the *Sanitary Inspector*, the bulletin of the board. The circulars are gratuitously supplied to local boards of health and to individual citizens in single copies, by the dozen, or by the hundred as may be required. A reference list of the blanks and circulars published by the State board of health is kept in the hands of the local boards of health. The last edition of this list includes the following:

- FORM 1.—Blanks for householder's and physician's notification of infectious diseases.
- 3.—Blank for the notification to teachers of infected houses or families.
 - 4.—Blank for re-admission of scholars from houses where there have been infectious diseases.
 - 6.—Form of notice to householders and physicians to report contagious diseases.
 - 7.—Weekly report of infectious diseases.

- 10.—1st Notice—Nuisance.
 - 10A.—1st or 2nd Notice—Nuisance.
 - 11.—Notice to cleanse and disinfect.
 - 12.—3rd Notice—Nuisance.
 - 13.—Notice to vacate.
 - 14.—Notice of Vacation of premises.
 - 15.—Report to State Board of Health of infectious diseases
in neighboring towns.
 - 17.—Blank—Notification to Physician.
 - 18.—Reference List and Order Blank.
 - 21.—Practical facts about cholera.
 - 23.—Earth Closets.
 - 27.—Does vaccination protect?
 - 29.—Treatment of the drowned.
 - 30.—Contagious and parasitic diseases of animals.
 - 36.—Abstract of the Health Laws.
 - 39.—Model By-laws.
 - 40.—Rules for house drainage.
 - 44.—Diphtheria Circular.
 - 45.—Scarlet Fever Circular.
 - 46.—Typhoid Fever Circular.
 - 47.—Is Diphtheria contagious?
 - 48.—Isolation of the infectious sick.
 - 49.—Motives and methods for sewerage cities, villages,
towns and summer resorts, and for domestic sani-
tary improvements, house plumbing, etc., etc.—
Jordan.
 - 50.—Contagious diseases and contagion.
 - 51.—To teachers.
 - 53.—Characteristics of the Infectious Diseases.
 - 54.—Prevention of Consumption.
 - 58.—Notice of the annual meeting of the local board of
health.
 - 65.—On building schoolhouses.
 - 68.—Disinfectants and Disinfection.
 - 69.—Diagnosis and Management of Smallpox.
 - 70.—Disinfection of the Rooms and Things used by Con-
sumptives.
 - 71.—On the Management of Outbreaks of Smallpox.
- Placards for diphtheria, scarlet fever, and smallpox.

SECRETARY'S REPORT.

During the two years for which this report is made there was no change in the membership of the board. The names and addresses of the members at the end of the year 1901, with the dates of expiration of their terms of office were as follows:

G. M. Woodcock, M. D., Bangor, term ending January 31, 1902.

C. D. Smith, M. D., Portland, term ending January 31, 1903.

A. R. G. Smith, M. D., North Whitefield, term ending January 31, 1904.

E. C. Jordan, C. E., Portland, term ending January 31, 1905.

M. C. Wedgwood, M. D., Lewiston, term ending January 31, 1906.

Prof. F. C. Robinson, Brunswick, term ending January 31, 1907.

At the annual meeting in March, 1900, Dr. C. D. Smith was unanimously re-elected president for the ensuing year. The following committees were appointed by the President.

On Finance.—M. C. Wedgwood, F. C. Robinson, E. C. Jordan, and the Secretary.

On Circulars and other Publications.—G. M. Woodcock, A. R. G. Smith, and the Secretary.

On Sewerage and Drainage and the Disposal of Excreta.—E. C. Jordan, F. C. Robinson, A. R. G. Smith, and G. M. Woodcock.

On Ventilation.—E. C. Jordan, and M. C. Wedgwood.

On Summer Resorts.—M. C. Wedgwood, E. C. Jordan, and the President.

On Water and Water Supplies.—F. C. Robinson, M. C. Wedgwood, and the Secretary.

On School Houses and School Hygiene.—F. C. Robinson, A. R. G. Smith, and the Secretary.

On Quarantine.—The President, M. C. Wedgwood, G. M. Woodcock, and the Secretary.

On Legislation.—The Secretary, the President, and M. C. Wedgwood.

On Disinfection and Disinfectants.—F. C. Robinson, C. D. Smith, and the Secretary.

On the Production and Use of Vaccine Lymph, Antitoxin, and other Inoculation Material.—C. D. Smith.

At this meeting, the Secretary reported to the board in regard to the present status of the smallpox prevalence in New Brunswick and in the Province of Quebec and that he had urged all the local boards of health in the northern Aroostook towns and, especially, in the Madawaska region to be on the lookout for the possibility of the arrival of infectious cases, and to be ready to take prompt measures in connection with such an emergency.

Complaints having been made against the condition of a sewer in the village of North East Harbor in the town of Mt. Desert, and the municipal officers having asked the State Board of Health to investigate the matter for them, the Secretary reported his correspondence in regard to the subject and laid the whole matter before the Board. So far as the Board could judge from the correspondence touching the matter, and from an examination of the plans and specifications submitted by the engineer who supervised the construction of the works, there is no good reason for a complaint in regard to the sewer. The Secretary was instructed to report this opinion to the municipal officers of the town of Mount Desert, and, at the same time, advise the municipal officers to have a competent sanitary engineer visit and make a personal inspection of the conditions.

The Secretary was asked to express to our members in Congress the desirability of a National law against the adulteration of foods, beverages, and condiments, such as is now presented to Congress in H. R. Bill 2561 and Senate Bills 2050 and 2222.

The subject of the transportation of corpses and the desirability of having rules and regulations for our State similar to those which have been adopted by the State Boards of Health in many other states, or uniform with those, was considered by the Board. A few points were noted in the rules adopted by other

states in which it is deemed desirable that changes should be made. A special committee was appointed by the President consisting of the Secretary, Dr. Wedgwood, and Professor Robinson to consider an investigation of this whole matter, and, especially, that of embalming or disinfecting bodies of persons who have died of infectious diseases.

In discussing the subject of a sanatorium in the State of Maine for the treatment of consumptives, the sentiment of the Board was to the effect that such an institution is much needed.

At the June meeting of the Board, the Secretary reported the action which he had taken in connection with the threatened invasion of smallpox into Van Buren and the surrounding townships.

The Committee on Legislation was instructed to draw up a bill to be presented to the legislature, empowering the State Board of Health to make rules and regulations for the transportation of the corpses of persons who have died of infectious diseases.

At the third quarterly meeting of the Board, the bill drafted by the Secretary, in compliance with instructions of the Board, relating to embalming and the transportation of corpses, was referred to the Committee on Legislation, and the Secretary was instructed to confer with the embalmers association about the matter.

Though not strictly official business, the Board, believing that the beneficial influence upon the public health of a sanatorium for consumptives would be so great, the members of the Board deemed it entirely justifiable to take steps to bring the need of such an institution to the attention of the public and to initiate, if possible, a movement in the direction of having one established in the State. It was, therefore, voted that each member use his influence to bring about a meeting at the State House sometime in December, of those persons who are interested in the matter for the purpose of organizing a Maine State Sanatorium Association.

Nearly all of the time of the December meeting of the Board was devoted to the consideration of the urgent need of a well equipped laboratory as an aid to the public health work in this State, and the preparation and presentation of a bill providing for the establishing of such a laboratory.

Another matter discussed was that of the best ways of furthering the work which the Maine State Sanatorium Association, organized to-day, has set itself to do. The Secretary was authorized to offer to make, temporarily at least, the *Sanitary Inspector* the organ of that Association, as well as that of the State Board of Health.

At the annual meeting of the State Board of Health in March, 1901, Dr. C. D. Smith of Portland, was unanimously re-elected President.

At this meeting the Secretary reported to the Board that the inspection service at Vanceboro which was established by the Surgeon-General of the Marine Hospital Service, in February, upon the recommendation of the State Board of Health on account of the prevalence of smallpox in some of the counties of New Brunswick, has been discontinued for the reason that the outbreak in New Brunswick appears to be practically stamped out.

On account of the increase of the other kinds of work in the office of the Board, and the failure of the legislature to provide for the doing of any kind of chemical or bacteriological laboratory work, the Board finds itself compelled to instruct the Secretary not to continue the work of water analysis excepting when the application for such work is made by local boards of health, and when reasons are presented which indicate a special and urgent need of work of this kind.

The Secretary reminded the Board of the great saving in postage which is affected by the publication of the *Sanitary Inspector* and the substitution of pound rates for the ordinary circular rates in sending communications to local boards of health and to the general public.

The Secretary submitted to the Board the correspondence which has arisen on account of the sending out of a circular letter by the Anti-Vaccination League announcing that space had been allotted to them for an anti-vaccination exhibit in the Liberal Arts Building at Buffalo. The suggestion to establish an American Jenner Society he reported, had been very cordially received by many states, provincial, and municipal health departments in the United States and Canada from which he had heard. He had also received many thanks for bringing the matter to the attention of the health officers of the country and many congrat-

ulations on his success in causing the allotment of space to the anti-vaccinationists to be withdrawn.

An International Tuberculosis Congress, to be held in London early in June, is looked forward to by sanitarians generally, and particularly by those persons who are interested in the movement for the lessening of the prevalence of pulmonary consumption, as a very important public health event. As Professor Robinson expects to be in London about that time, it was voted to authorize and request him to attend the Congress as a delegate from the State Board of Health of Maine.

At a special meeting of the State Board of Health, June 18, the whole session, forenoon and afternoon, was given to a consideration of the smallpox situation in this State and in other places whence the infection may be imported. At the present time there are 5 cases of smallpox in Milo, 2 in Dexter, 2 in Lagrangé, 1 in Lewiston, 8 in Bangor, 1 in Portland, and in the Penobscot river at Fort Point there are two vessels, the steamer Winifred, and the schooner F. P. Blackburn, each with a case of smallpox aboard. On our border there are two cases of smallpox in St. Leonards, N. B., near Van Buren, 38 or 40 cases at Berlin, N. H., on the Grand Trunk Railway, and on the Canadian Pacific Railway at Agnes and Megantic, Province of Quebec, 18 miles from Lowelltown in our own State, there are or have recently been 8 cases.

Dr. H. H. Hammond, of Van Buren, and Dr. J. Archambault, of Ft. Kent, were recently appointed by the President and Secretary to act as inspectors or agents for the Board in case of the actual or threatened presence of smallpox in the Madawaska region, Dr. Hammond keeping watch over that portion below Edmundston, and Dr. Archambault over that part above that point.

The Secretary also reported the action which had been taken in view of the presence of smallpox in Berlin, N. H., and his correspondence with the local board of health of Greenville, and with Dr. Hunt with reference to tracing out any possible source of infection in that region.

At this point in the proceedings of the Board, Dr. Riopelle, of Greenville, who in coöperation with Dr. Hunt has been vaccinating the people in the Moosehead Lake region, came in and supplied information relative to conditions there and what had been done.

In regard to the situation at Agnes and Megantic, the report was made to the Board that Dr. William Cowie, of Lowelltown, had been appointed inspector, and that the Canadian Pacific Railway Company, at Montreal, had very cordially coöperated with the State Board by sending a pass to Dr. Cowie, by ordering the vaccination of all their operatives on that part of their line within the State of Maine, and by instructing their station agent at Megantic to permit the posting of a notice in the station to the effect that "no person from Agnes or Megantic or from neighboring way-stations shall come to Lowelltown, Skinner, or any other place in the State of Maine without a special permit from the inspector or other duly authorized agent of this board."

"It was voted that the action of the President and Secretary in appointing inspectors at Van Buren, Ft. Kent, and Megantic be hereby confirmed by this Board."

It was further voted, "That the Board delegate authority to the President and the Secretary, acting together or singly to appoint, in case of emergencies, inspectors or agents to act for the State Board of Health and to confer upon such inspectors or agents power to take such action as may be deemed necessary."

At a special meeting held December 10, the Secretary submitted to the Board a circular letter which had just been sent out to the local boards of health calling their attention to the great danger from smallpox at the present time, and the need of assuring themselves that the inhabitants of the various towns are safely protected by vaccination.

Dr. Smith reported verbally in regard to the case of smallpox in Biddeford, Dr. Woodcock about the outbreak in Bangor, and Dr. Young relative to a case in Bath.

SMALLPOX IN 1901.

During the year 1900 the State was fortunate in escaping with only a very few cases of smallpox imported into the city of Portland. In the latter part of May, 1901, however, and in the early part of the following month, smallpox broke out nearly simultaneously in a considerable number of places, and its appearance, about the same time, at various places outside of our State near our boundary line, or in places in intimate relation with the towns and cities of our State, required, for several months, the unremitting watchfulness and activity of State and local boards. The following is a history of these outbreaks, and particularly of the part which the State Board of Health took in aiding the local boards to guard against the danger.

Milo.—In the evening of Sunday, May 26, I received a telephonic message from Dr. Hall, of Dover, telling me of a suspected case of smallpox in the town of Milo. I promised to start on the 1.35 A. M. train that night to see the case, but, at midnight, Dr. Woodcock, of Bangor, a member of our board telephoned that he had also been notified, and had been asked to go to Milo, and that he would start in the morning. Dr. Woodcock reported that a man, his wife, and child, had taken the Canadian Pacific Railroad for the West. In Montreal, the man became sick, and they went to a hotel in that city. On account of his illness they returned to Milo. In due time after their return from Montreal the woman became sick with what appeared to be premonitory symptoms of smallpox. When seen by Dr. Woodcock she had been ill eight days. The husband and child subsequently came down with the same disease. The instructions from this office to the secretary of the local board of health of Milo, sent May 30, were as follows:

“It will, in a few days, be time for you to be on the watch for secondary cases of smallpox as a possible result of exposure to the first case. You should arrange to have all suspects kept

under observation. Every one of them should be seen every day by a physician, if that is possible, and upon the least symptom of illness they should be isolated until it can be determined whether they are to have smallpox. You should have preparations all made so that any new cases may be isolated. If you have cases or suspicious cases notify me immediately by telegraph or telephone. Read very carefully Circular No. 71 which will, I think answer about every question in regard to the management of cases which may come to your mind."

Dexter.—May 27. I was asked over the telephone to come to Dexter to see a suspected case of smallpox. This was too late to take the afternoon train. Went to Waterville in the evening so as to take the 6.20 train from that place the next morning. In Dexter, early in the forenoon of May 28, I found that the case was that of a young Frenchman who had never been vaccinated, who had recently come from Greenville. He was sick at the Dexter House, where he had been at work as a chore boy. A physician was called on the evening of May 22. He had had a temperature of 104 and intense pain in sacrum and lumbar regions. He had then been ill two days. May 24, eruption appeared on the forehead and chest at first. The case was then thought to be measles. He was cautioned not to run around the house, thereby subjecting others to the infection of measles, but, as the winter before, most of the persons at the hotel had had measles, no one was afraid of the infection. Sunday, the physician was away all day, and the eruption being well out, the patient felt so much better that he concluded to go to the Catholic church, and did so. Subsequent investigations showed that the two persons in the pew with him, and between whom he sat, had both been vaccinated. Monday, upon the return of the physician, the appearance of the eruption suggested smallpox.

I found a mild case of smallpox with discrete eruption.

Advice given to the local board of health was immediate quarantine of the hotel and all persons there, and immediate vaccination of all persons exposed, and a general vaccination as soon as practicable.

The removal of the patient as soon as a place to shelter him can be had.

To place a guard over the hotel and to keep him there day and night.

A trustworthy man at the isolation camp to serve as an attendant and a guard.

The disinfection of the hotel as soon as the patient is removed. The length of the period of quarantine of the Dexter House was left undecided for the present.

A troublesome incident connected with this outbreak was the escape from the hotel of Lillian Stover, the cook. After much difficulty in tracing her by telegraph, telephone, and otherwise, she was finally located in the town of Orono, and quarantined there.

Van Buren.—June 2. A telegram was received in the office of the State Board of Health stating that there was an outbreak of smallpox in St. Leonards, N. B., a few miles from our boundary line. The local board of health of that town were asked for further information in regard to the danger to the people on our side of the line, and a small supply of vaccine lymph was sent. Circulars of instruction, 69 and 70, were also sent.

In answer to my inquiry, it was learned that a Frenchman, who had been at work in the family, infected with smallpox, ran away when he learned the nature of the disease, and it was learned that he had traveled down through Hamlin and Caswell Plantations. Dr. George E. Washburn, of Augusta, was sent to investigate the matter, and to trace out the course of this man, and to vaccinate all persons who had been exposed to him, and to secure the disinfection of bedding, rooms, etc., in the houses at which he had stopped. This he did, and in coöperation with the local board of the two plantations, the exposed persons were kept under observation until the expiration of the period of incubation. Dr. Washburn followed him to the town of Lime-stone, where a telephonic message to this office stated he had come. He found, however, that he had retraced his steps, and had returned to the infected house in St. Leonards, whence he came, and had given himself up to the authorities, who quarantined him.

June 14. A report was received from Dr. Hammond of Van Buren who acts as an inspector for that region that he had investigated a case in Hamlin Plantation which was reported to have been exposed to smallpox infection, but the history which he learned indicated that this was an error.

Office of State Board of Health.—June 3. The following Neostyle letter was sent to every local board of health, together with a copy of Circular No. 71:

"Our State is now threatened with smallpox from many different points. There is one case in Milo and many exposures resulted; one case in Dexter, and many persons were exposed; one case in Lewiston reported this morning; and one near Van Buren on New Brunswick side. There is danger of the importation of the disease by the way of the Canadian Pacific Railway, and at Berlin, N. H., on the Grand Trunk there are 33 cases according to recent report from the State Board of Health of New Hampshire. In many other states, as well as in the Canadian Provinces, smallpox is unusually prevalent.

"There is therefore urgent need that each local board of health be fully organized and ready to act instantly if a known or suspected case of smallpox, or exposure to smallpox, occur in its town.

"Examine Circular 71 carefully, and, if need be, act promptly as it advises.

"If you have a suspected case do not make the serious mistake of waiting until you are sure what it is before isolating. Quarantine at once, temporarily, at least, and decide later.

"Free vaccination should be offered in every town. A few tubes of vaccine lymph should be kept on hand so that, in case of an emergency, exposed persons may be vaccinated promptly.

Yours truly,

A. G. YOUNG, *Secretary.*"

Lagrange.—June 4. Dr. Woodcock reported through the telephone that there was a suspected case of smallpox in Lagrange. He visited the case and found it to be smallpox. One additional case occurred in this town resulting from exposure to the first case.

Lewiston.—June 4. A report was received from the local board of health of Lewiston that a case of smallpox had been found in the Sisters' Hospital in that city.

June 21. At the request of the local board of health, the Secretary visited that city and with Dr. Wedgwood of the State Board, a conference was held with the local board and the mayor in regard to the smallpox situation. There were, at that time,

eight cases and a number of tenement houses were under quarantine. Several of these cases had originated in the Hospital from exposure to the first case. The source of the infection in some of the other cases could not be traced.

Danger from Berlin Falls, N. H.—Office of State Board of Health.—A somewhat extensive outbreak of smallpox occurred at Berlin Falls, N. H., and the local authorities did not discover it until the disease had been present some time. The danger of the importation of infection into our towns appeared to be imminent, as the probability existed that some persons from Berlin Falls had escaped before the local board and the State Board had been able to trace out all infected houses and to quarantine infectious persons. One case of smallpox which came from Berlin Falls was found in the Sisters' Hospital in Lewiston. A letter was therefore sent to all of the hospitals in the State warning them against the reception of persons from New Hampshire or persons who had recently been in that State. On the same day, a circular letter was sent to all of the cotton and woolen mills in the State, and also one to each Railway Company warning them of the danger of the importation of smallpox and advising that certain precautionary measures be observed.

Lowelltown.—June 8. In the latter part of May information was received from Lowelltown, the first station in the State of Maine coming east, that there were some cases of smallpox in Agnes and Megantic, the first stations west from the boundary line. The Moose River Lumber Company at Lowelltown employed about one hundred and fifty men, and at the next station, Skinner, a few miles farther east, Skinner, French & Co. employed about the same number of men. At Lowelltown the lumber company employed a physician, Dr. William Cowie, to look after the health of the men and their families. A letter was written from this office to Dr. Cowie May 27, accompanied by a copy of the public health laws, and with other blanks and circulars which might be of help to them in an emergency. The doctor was urged to arrange for the vaccination as quickly as possible of all persons in the employ of the company. On the 8th of June the following letter was received from Dr. Cowie:

"Your favor of 27th to hand. I wish to report progress of smallpox in Agnes. I stated in my last that it was in Megantic. There are two separate villages separated by a 40 foot bridge.

The cases are all located in Agnes but Megantic is the railway starting point. There are in all about 9 cases. A girl was first taken. Her brother moved over to an hotel. He was taken sick on Thursday 30 ult. Only declared to be smallpox on Tuesday, 4th. Hotel with 17 boarders quarantined. Railway conductors report 7 new cases to-day all in this hotel. Hotel is a low class house. Frequenters are French and ignorant. Quarantine is still lax according to report of trainmen.

"Regarding vaccination here people seem to be unwilling in great majority.

"The work I have here is on contract plan to treat them during sickness and injury, etc. I offered to vaccinate at 10 cts. per head which is cost. What I would suggest is that the Board of Health request the C. P. Railway to refuse to sell tickets from Megantic to any part of the State and to refuse to sell return tickets from any part of the State to Megantic. Also that no stop over privileges be granted on through tickets from Megantic. That no tickets be sold at or passengers carried from stations between Megantic and Scotstown to points in this State except on through express trains; that no passengers be taken at flag stations between Megantic and boundary; that the C. P. Railway should kindly take any measures they may see fit to prevent the ingress of passengers from infected points.

"I suggest the above on account of a thorough knowledge of the carelessness of the average French Canadian concerning all infectious diseases."

As this letter indicated considerable danger to the people on our side of the line, authority was conferred upon Dr. Cowie by telegram and by mail to act as an inspector for the Board. On the same day a letter was written to the General Manager of the Canadian Pacific Railway at Montreal bringing his attention to the danger of the importation of smallpox into our State along the line of his road.

The situation at Lowelltown was rendered more difficult by the fact that Lowelltown is an unorganized plantation and that, consequently, there was no local board of health and no municipal officers there.

As there was some room for doubt as to the authority of the State Board of Health or of its inspectors in case certain contingencies should arise, and whether the Railway Company had

not been asked to do some things which they might not be able to do, the advice of the Attorney-General was obtained.

One of the lumber companies in that region telegraphed to the Secretary: "If you don't come here and keep people from coming and going to Megantic smallpox will be all over the county. Don't make the serious mistake of delaying." The need of my presence in the office at the State House on account of the danger of smallpox in other places as well as at Lowelltown necessitated the following reply: "Would be serious mistake to go to Lowelltown. Can do much more for you right here now."

A telegram was received from the officers of the Railway Company indicating a cordial compliance with the request which had been made, but, a few hours later, another telegram from Montreal was received which read as follows:

"MONTREAL, QUEBEC, June 11, 1901.

A. G. Young, Augusta, Me.:

Fear we cannot legally refuse as arranged to sell tickets as requested by you, can you not instead if you consider it necessary put inspectors on trains Megantic to boundary. We will be glad to furnish them with passes and to facilitate their work in every way.

THOS. TAIT."

Upon the same day when these telegrams were received a supply of notices like the following, which had been previously prepared and printed in anticipation of their use, was forwarded to Dr. Cowie:

NOTICE.

Until further notice no person from Agnes, or Megantic, or from neighboring way stations shall come to Lowelltown, Skinner, or any other place in the State of Maine without a special permit from Dr. William Cowie or other duly authorized agent of this Board. All persons arriving without such permit will be placed in quarantine upon arrival.

By order of

STATE BOARD OF HEALTH.

AUGUSTA, MAINE, June 11, 1901.

Dr. Cowie was instructed to post or to have these notices posted plentifully at Skinner, Lowelltown, Megantic, and Agnes so as to give abundant notice to the people upon the other side of the line that their presence was not desired in Maine for the

present. He was also furnished with blank permits to be issued to all persons in places on the other side of the line who had any legitimate business in Lowelltown. As an indication of the effective working of this system there was received a few days later the following letter from the same company which had previously sent the urgent telegraphic message urging the personal presence of the Secretary of the State Board:

"We are very much pleased with the way you have taken hold of the smallpox matter, and the notices you sent Dr. Cowie are posted up, and they are a great help, as so far, no one has refused to get right out who has come here from Megantic after being told to go, and the situation explained. We wish there was a good Justice of the Peace and a Sheriff here but the real facts are there is not at the present time just the right men here for those positions who can and would take them. Presume Mr. McDonald may do all right for now for Justice, but they need a good man for Sheriff here, one who would not act too hastily but one who had plenty of sand to do his duty when the time comes to act. At Megantic, we hear that the smallpox situation is looking a good deal more favorable."

The reference in this letter to the need of a justice of the peace and a deputy sheriff was prompted by the fact that the State Board of Health had made an endeavor to have a justice of the peace and a deputy sheriff appointed in Lowelltown. The cause of the failure to secure their appointment is indicated by this letter.

Bangor.—June 10. A telegram was received from Dr. Woodcock, member of the State Board of Health and chairman of the local board of health, that there were five suspected cases of smallpox in the city. Another telegram on the 12th notified the office of additional new cases. In December, another outbreak of smallpox occurred. A telegram received on the 23d stated that there were five cases and three houses quarantined. The number of cases of smallpox for the year was nineteen.

Fort Point.—June 16, a communication was received from Dr. Woodcock, over the telephone, about the Steamship Winnifred, laden with coal and destined to Bangor, but which had a case of smallpox aboard. A consultation was held between the president, the secretary of the board, and Dr. Woodcock, in regard to the powers and duties of the State Board in relation

to this case. The need of a fully equipped station somewhere upon the coast of Maine where infected persons might be taken off and where the ship might rapidly and efficiently be disinfected and discharged from quarantine was strongly felt. Dr. Woodcock finally, with his confrères of the city board of health of Bangor, ordered the steamer not to proceed up the river to Bangor. Over the telephone, a conference was held with the board of health of Stockton Springs about the matter. She dropped anchor at Fort Point, at the mouth of the Penobscot, and was visited by the health officer of Stockton Springs. June 20, this steamer weighed anchor, broke quarantine, and sailed to Boston, where it was possible for her to receive rational modern treatment. Dr. Durgin, chairman of the board of health of Boston, was notified of her coming.

On the same date that the Steamer Winnifred sailed away, the Schooner S P. Blackburn came to anchor at Fort Point, in accordance with the orders of the board of health of Bangor. She was also laden with coal intended for Bangor, and had also one seaman aboard sick with smallpox. The secretary of the State Board visited Fort Point and Stockton Springs, June 26, for the purpose of consulting with the local board of health of that town. It was found that she was not boarded by a physician until June 22. The men were then all vaccinated,—nine including the captain. The immediate revaccination of all who then showed no evidence of a take was urgently recommended. The suggestion was made to the local board of health to build a temporary camp, and to bring the patient to it and to closely guard him there, thus making it possible to disinfect the ship and discharge her from quarantine earlier than would otherwise be possible. On the other hand, there was the unreasoning fear of the citizens of the town and of summer visitors. The local board of health decided that, in the interest of the summer business of the town, the patient must remain aboard the schooner.

July 4, the secretary of the State board visited Fort Point, and with Dr. Pierce went out and boarded the Schooner Blackburn. It was found that the process of desquamation of the patient was so far advanced that it would be safe to give him and the ship their final disinfection in a few days, and an understanding was had with the captain as to how the disinfection should be carried out, and the following relating to the methods of disinfecting the schooner were sent to the local board of health a few days later:

MEMORANDA RELATING TO SHIP DISINFECTION.

Schooner S. P. Blackburn.

The first step should be to provide disinfected clothing for the patient's use after he has undergone his personal disinfection, and for the men after they have ceased to handle the infected clothing and other articles.

In disinfecting the clothing and bedding one set of men should bring up the infected articles and place them in the steam chest (ice box). Another set of men who have put on disinfected clothing should take the disinfected things from the box and throw them over the lines stretched over some part of the deck where they may dry where they will not be liable to reinfection before the whole job is completed.

The Patient—His Personal Disinfection. Bring him to the lee side of the deck, let him remove his clothing and thoroughly scrub his whole body with soap and warm or quite hot water. Wash off with clear water to remove the soap and then have him bathe thoroughly with solution of corrosive sublimate 1 : 3000 (1 dram to 3 gallons of water). The hair, particularly, should have great care and attention. He should then put on his disinfected clothing and go forward and remain there. Neither he nor the men handling the disinfected goods should go into the forecabin until its disinfection is complete.

Clothing and Bedding. To be disinfected with steam, including mattresses if any.

As the steaming may full up woolen goods slightly the best suits of the men which have not been badly exposed to contagion may be disinfected with formaldehyde, but the quantity of the clothing thus exempted from steam disinfection should be small. If a closet exists which may be made air-tight, a small part of the clothing may be disinfected in it by hanging it up and treating with specially large doses of formaldehyde ten or twelve hours, at least. In disinfecting clothing thus, not less than $\frac{1}{2}$ pint of 40% formaldehyde solution should be used for 100 cubic feet of enclosed space, and even then the clothing must be hung up so all the surfaces may be exposed.

Boots and Other Articles of Leather or Rubber. Wash or soak in Solution 7.

Trunks, Chests, and Bags, particularly in the forecastle. Wash outside with Solution 7. For the inside and the miscellaneous contents of small articles, disinfect by pouring about 1 ounce of formaldehyde solution (full strength) for each cubic foot of space upon an old towel or other cloth, an undershirt, for instance. Things to be thus disinfected should not be packed closely.

Forecastle. After the things have been sorted out and disinfected as in the preceding, wash floor and other surfaces with Solution 7. Then set the formaldehyde vaporizers going, using at least 1 pint of the solution (full strength) for each 2000 cubic feet of space. Keep closed for six or eight hours.

In preparing to use the vaporizers great care should be taken to guard against the possibility of fire. Before they are put in place the rooms to be disinfected should be made as tight as possible by closing all apertures and ventilators and pasting up doors with paste and paper or calking cracks and crevices carefully.

Cabin. Disinfect with formaldehyde, using at least a pint for 3000 cubic feet of space.

Engineer's Room (adjoining the forecastle). Disinfect with formaldehyde,—1 pint to 2,000 or 3,000 feet of space according to probable chances of infection.

Formaldehyde and solutions of formaldehyde have no injurious effect upon metals other than that which may result from the water in the solutions.

Decks. Wash down with water.

Infected Gangway leading from forecastle. Wash with Solution 7.

Waterville.—On the evening of June 18th a telephonic message was received from Dr. Bunker, health officer of Waterville, that a case of smallpox was present in the city. At his request, the Secretary of the State Board went up to that city the next morning. It was found that this case came from Greenville, Saturday, June 15, the eruption then having just appeared. He slept in one house that night and since then had occupied another boarding place. At the time of the visit he was quarantined in a small building outside of the city. Every fact possible was obtained from him which might shed light upon the question of the suspected focus of smallpox infection at Greenville or at some

point in the Moosehead Lake region. The bed occupied by the smallpox patient on the night of June 15 was occupied Tuesday night by two men who, finally it was learned after much investigation, had said they were going to Madison the next morning. This information was telephoned to the local board of health of Madison and as full a description of the two men as it was possible to get was sent, but the description was not very satisfactory. Here it may be said that Dr. Sawyer of the Madison board made a careful search for the two men, but he was unable to locate them. A companion of the man who had smallpox came from Greenville with him and slept with him until Tuesday when the case was discovered by Dr. Bunker. This man had never been vaccinated. The other persons who had been in contact with the patient are apparently protected by vaccination. Re-vaccination of them all, however, was promptly done. The whereabouts of other persons who had been exposed to infection in the rooms which this patient had occupied were traced as fully as was possible and information was given to other local boards of health whose towns were possibly endangered. Quite remarkably, no other case of smallpox occurred in Waterville.

Monson.—At the request of the local board of health of Monson, the Secretary of the State Board visited that town, June 25, to see a suspicious case. It was found that the patient, a man somewhere between twenty-six and thirty years of age, had been clerking in a store in the village, and had not, so far as could be learned, been exposed to smallpox infection. He had been vaccinated fifteen years before, but the clinical history of the case was not clear, and there was some discrepancy between the statement of the attending physicians and the patient. The eruption, the first few lesions at least, had appeared upon the body and upon the forearm, some of them as well formed vesicles of considerable size, when first discovered. When seen, the eruption was out over the face, arms, and trunk, but not upon the legs, the lesions consisting of small red spots and vesicles, but none of the incipient lesions distinctly papular. Incipient vesicles, a fully developed one, and macules found on the same parts of the body. A few of the vesicles were already slightly depressed in the center as the result of the early stage of desiccation. None of the other vesicles were umblicated. Over the forehead was a thick semi-papular eruption with no vesicular formation, but

upon the sides of the chin, there was a multitude of vesicles just forming, very minute in size. The patient was in bed, although he felt no need of staying there. It was deemed best not to make a definite diagnosis but to await further development of the eruption. Arrangements were made for the quarantine of the case.

This case was seen by Dr. Woodcock, of the State Board of Health, at two subsequent visits, and he reported to the Secretary of the Board that, in his opinion, it was an atypical case of smallpox.

Greenville.—The history of the first case of smallpox in Dexter; that of one in Portland, one in Bangor, and one in Waterville all pointed to the probability of a source of smallpox infection in or near Greenville. The local board of health of Greenville had been notified of the cases which seemed to be referable, so far as the source of their infection was concerned, to that town, and the board had been requested to make a very careful inspection of the whole village and town for the purpose of discovering, as speedily as possible, the source of infection. The letters received from there indicated that this was done, and in the interest of the public health and safety, Dr. Hunt had vaccinated the inhabitants in the unorganized townships in the lake region. Nevertheless, the source of infection had existed in the village of Greenville itself.

In compliance with the request in a telegram received from the local board of health of Greenville in the evening of July 11, the Secretary started for that place on the night train. The telegram announced a suspected case of smallpox in the village. This case had been reported to the local board of health as such by Dr. Hunt of Greenville. An examination of the patient showed that it was a typical case of smallpox in a moderately severe form. The case was found in the home of a blacksmith by the name of Hilton and the investigation showed that cases of smallpox had existed in this family for some time. It seems that a man by the name of E. Meserve came to work for Hilton April 25, and he finished working for him June 24. While at Mr. Hilton's, Meserve became sick and called Dr. Hunt to see him. There was no eruption present and at that time nothing in the smallpox history of the surrounding country or in the appearance of the case was suggestive of smallpox. The doctor

prescribed for him and told him that he would not call again unless he heard from him. He heard nothing from him. The next day an eruption appeared, but, with the coming of the eruption, the patient felt so much better that he sent no word to the doctor. This, the first case in the family, remained unrecognized as smallpox.

Chester Hilton a young man, son of the blacksmith, vaccinated fifteen years before and also more recently and bearing two good scars as evidences of successful vaccination, slept with Meservey while he was sick and while the eruption was fully developed. Later when Smith, the present case came to the house, Chester slept with him, sleeping with him also after the disease and the eruption was fully developed. He did not contract the disease in any form.

It was found that there had been four cases of smallpox in the Hilton family: Della Hilton, 16 years of age, became ill June 21 with headache, quite feverish, an eruption on the fourth day of illness, then the fever left and she felt much better. Norah Hilton, 14 years of age, became sick a few days later with about the same history with the additional symptoms of nausea and vomiting. Hattie Hilton, 9 years of age, was sick, as the mother said, only two days. Florence Hilton, 7 years old, had about the same history. These four cases had all been in a mild form, but the appearance of the dried-up eruption indicated unmistakably the nature of their disease. None of these girls had been vaccinated save the eldest.

The house was already under quarantine. The advice given to the local board of health was the immediate removal of the patient to a camp to be constructed in a field at a sufficient distance from the village; strict quarantine of the house until such time as it would be safe to make the final disinfection. Arrangements were made that evening for the building of the isolation camp, and the next morning early while going to the station, men were observed again at work on it.

A disquieting circumstance in connection with this outbreak was the fact learned while in Greenville that the two elder girls who had been sick had, with scabs upon their faces, gone up to Kineo on one of the crowded boats which conveyed passengers to and from that place, two days before, on July 10 during the sportsmen's excursion to that place. Mr. and Mrs. Hilton also

went to Kineo on another one of the lake steamers. Through the press a notice was given to the public so that those persons who had possibly been exposed might avail themselves of vaccination. So far as is known, no cases resulted from this exposure. There were no subsequent cases in Greenville.

Orono.—No case of smallpox developed in Orono, but Orono, Mattawamkeag, Dexter, and other towns incurred an expense in tracing out the whereabouts of Lillian Stover, the woman who escaped from the Dexter House. She was finally found in Orono and quarantined there.

July 24. The Secretary of the State Board heard that there were suspicious cases in Orono which had been called "Cuban itch." As this term had generally, through the country, been a synonym of modified smallpox, the town was visited by the first available train. Dr. Bayard, who had attended most of the cases, but who had not called them cases of "Cuban itch," drove around and showed them. Seven or eight cases, all affecting children, were seen and they were found to be cases of impetigo contagiosa as the doctor had diagnosticated them.

Bath.—The Secretary went to Bath, July 28, to see a suspected case which was found to be smallpox. The local board of health immediately held a meeting to consider what measures should be taken to prevent the spread of infection, and at the request of the local board of health, the Secretary remained at the meeting. Again, December 7, in company with Dr. Marston, health officer of Bath, a young lady who had lately been in Emerson Hospital, in Boston, was seen. A few papules appeared on face, arms, and legs, that morning. Before making a positive diagnosis it was necessary to await the further development of the eruption. The patient was again seen, December 11, by both the President and the Secretary of the Board, and though a very atypical case, it was pronounced smallpox.

Houlton and other Border Towns.—July 30. A telegram was received from Dr. C. E. Williams, secretary of the local board of health, giving the information that there were cases of smallpox on the New Brunswick side of the line in Carleton county. The Secretary of the State Board left on the noon train and reached Houlton in the evening. That evening he had a consultation with the local board of Houlton. It was learned from the local board of health that the Riverside campmeeting was to be held in the town of Blaine August 2—three days hence.

The next morning Dr. Williams, in accordance with previous arrangements, drove over on the New Brunswick side to gather the facts in regard to the outbreak and especially to learn about persons on our side of the line who had been exposed to the infection. At the same time, the Secretary of the State Board drove to Monticello and to Littleton for the purpose of seeing the local board of health at each of these towns. In the afternoon after Dr. Williams' return, a meeting was again held with the local board of health for the purpose of reporting and for further consultation. Members of the Monticello and Littleton boards of health were present at this meeting. Dr. Williams reported that he had personally seen one of the cases of smallpox and unhesitatingly confirmed the diagnosis which had been made by the Woodstock doctors. Mr. Smith, the manager of the Riverside campmeeting in Blaine was seen and was advised that the campmeeting should not be opened at that time, but as the powers of the State Board of Health in relation to this question are not clearly defined in the law, it was deemed best not to assume authority which the State Board did not apparently clearly have. As it was found that there was no prospect of a postponement of the meeting, the procedure then and there planned as a substitute for the prohibition of the campmeeting was a system of inspection and control of the roads leading into our towns from New Brunswick. The local boards of health with whom it was possible to communicate were advised to put this plan into operation immediately.

Arriving in Augusta in the forenoon and starting work in the office of the State Board, the Secretary went to Portland in the afternoon to see the Attorney-General and had a long consultation with him in the evening. The following special order was submitted to him. Later, in compliance with the requirements of the law, it was submitted to the Governor and Council for approval.

"NOTICE.

Special Order of State Board of Health.

On account of the presence of smallpox in the parish of Wakefield, N. B., and the uncertainty that it may not exist in the neighboring parishes, it is hereby ordered that persons from New Brunswick shall not come to the Riverside campmeeting, in the town of Blaine.

Persons violating this order will become liable to arrest and quarantine, and, as the law provides, they 'shall be punished by a fine of not more than five hundred dollars, or by imprisonment in the county jail for a period of not more than six months, or by both fine and imprisonment, in the discretion of the court.'

By order of

STATE BOARD OF HEALTH."

AUGUSTA, MAINE, August 1, 1901.

This special order was printed in large numbers and was sent to the local boards of health of Houlton, Littleton, Monticello, Bridgewater, Blaine, and Mars Hill for distribution, for posting up, and for putting into the hands of travellers who were going into New Brunswick. The local boards of health were advised also, aside from the total prohibition of all travel from New Brunswick to the campmeeting, to discourage all unnecessary travelling back and forth. A special letter of instruction was forwarded to each of these local boards of health, and the following Neostyle letter was sent to the local board of health in Aroostook county.

"Dear Sir:—This letter is sent to the secretaries of the local boards of health of all towns in Aroostook county.

"July 30, I received a telegram from Dr. Williams of Houlton, that smallpox exists in the county of Carleton, N. B. Since this I have most of the time been up and down the line from Houlton to Mars Hill. A campmeeting, which was to be held in the town of Blaine from August 2 to 11, presented a special danger from the fact that fully one-half of the attendance comes from the provincial side. In the absence of clearly defined authority to order the campmeeting not to be held, a special order was passed by the State Board of Health prohibiting the attendance of persons from any part of New Brunswick. Guards had been placed upon every road crossing the line from the Houlton and Woodstock road to the road running around north of Mars Hill. In addition to the prevention of attendance upon the campmeeting, the guards were instructed to discourage all unnecessary travel back and forth.

"Under date of August 1, I received a report from the secretary of the provincial board of health, written from Woodstock, in which he said that about thirty cases of smallpox had then

been found, but that it was learned that the disease had existed in Carleton county for some time. It is in the same mild form which most of the cases have assumed during the last two or three years. That, however, is no excuse for any local board not to be vigilant in keeping infection from within its boundaries or for not watching for suspects.

"So far as I can learn, the cases on the provincial side extend from a point about opposite to the southern boundary of Littleton to a case near Baird's Mills, not far from the southeast corner of Blaine. The quarantine regulations of the provincial authorities appear to be efficient but the great danger to be apprehended, I think, is from undiscovered cases, or from houses in which cases have already recovered and may have been overlooked.

"If your town is not already well protected by vaccination, free vaccination should be offered by your board, and all persons who arrive in your town from the infected parts of New Brunswick should be kept under observation until two weeks have passed since their last possible exposure to infection. All such suspects need not necessarily be quarantined, but you should arrange to be informed of the first symptoms of illness.

Yours truly,

A. G. YOUNG, *Secretary.*"

Friday, August 2, the Secretary took the noon train from Augusta and arrived at Mars Hill in the evening having seen representatives of the Houlton and of the Monticello local boards at their respective stations on the way up. That evening arrangements were made for a meeting early the next morning with the local board of health of Blaine and that of Mars Hill. After the meeting, the Secretary drove from Mars Hill to the campmeeting ground where the campmeeting had opened that morning, and then to Blaine village to see members of the local board of health of that town, and then to Monticello. From Monticello the train was taken to Houlton.

Some of the people up country requested that a telegram be sent to President Cram of the Bangor & Aroostook asking him to call off the excursion trains which were to run to the campmeeting grounds Sunday, one from up country towns and the other from Houlton.

On the way down, it was found that the system of guarding the roads was so complete that it was concluded that there was no danger of persons from across the line coming aboard the train at Houlton. The only question was whether the C. P. road might not bring excursionists from Woodstock and the surrounding region into Houlton so that they could get aboard the train. A positive assurance was, however, received from the C. P. station agent at Houlton that absolutely no trains would run into Houlton after the 10 P. M. Saturday train—no Sunday trains.

That same evening, August 3, the train was taken to Blaine and Mars Hill. The next morning, Sunday, August 4, after seeing the members of the Blaine and Mars Hill boards of health, the campmeeting ground was visited. From there about noon, a drive was taken to Baird's Mills over at the boundary line for the purpose of seeing E. O. Collins, a member of the local board of health of that town. On account of the illness of the guard who had been on duty at that point, he was taking his place for that day. He was hired to go to the campmeeting ground Monday morning and to remain there until the close of the meeting to act as a special detective. His duty was to be to watch for the possible appearance of any persons from New Brunswick and if he found any such, quietly to advise him to return across the line, and in case of refusal to do so promptly, to take him in charge or to hustle him over the line.

Returning to the campmeeting Sunday, it was found that of various persons who had been watching for the possible appearance of persons from the New Brunswick side, not one had been seen all day. That fact was taken as very good evidence of the efficiency of the system of control of the travel from the New Brunswick towns, since ordinarily, of the two thousand persons or so who visit the campmeeting, about one thousand of them have come from places in New Brunswick.

As Dr. Hill of Monticello and the Monticello board wished advice about some matters, the Sunday evening train was taken to Monticello. The Monday morning train was taken to Houlton.

It was learned while up on this visit that there was one case of smallpox one mile from the Monticello line, one case three-quarters of a mile from the line, and at Baird's Mills, which is on the

line between Bridgewater and New Brunswick, there was one case only a quarter of a mile from the line. Cases therefore extended all the way from about opposite the south line of Littleton to the centre of the Bridgewater line. So far as could be learned, the New Brunswick authorities had established quite an efficient system of quarantine with guards upon the roads leading from their infected district.

As soon as possible after reaching the office at the State House, Tuesday, the 6th, the following circular letter was issued:

"Dear Sir:—This letter is sent to the secretaries of the local boards of health of all towns in Aroostook county.

"July 30, I received a telegram from Dr. Williams of Houlton, that smallpox exists in the county of Carleton, N. B. Since this I have most of the time been up and down the line from Houlton to Mars Hill. A campmeeting, which was to be held in the town of Blaine from August 2 to 11, presented a special danger from the fact that fully one-half of the attendance comes from the provincial side. In the absence of clearly defined authority to order the campmeeting not to be held, a special order was passed by the State Board of Health prohibiting the attendance of persons from any part of New Brunswick. Guards had been placed upon every road crossing the line from the Houlton and Woodstock road to the road running around north of Mars Hill. In addition to the prevention of attendance upon the campmeeting, the guards were instructed to discourage all unnecessary travel back and forth.

"Under date of August 1, I received a report from the secretary of the Provincial Board of Health, written from Woodstock, in which he said that about thirty cases of smallpox had then been found, but that it was learned that the disease had existed in Carleton county for some time. It is in the same mild form which most of the cases have assumed during the last two or three years. That, however, is no excuse for any local board not to be vigilant in keeping infection from within its boundaries or for not watching for suspects.

"So far as I can learn, the cases on the provincial side extend from a point about opposite to the southern boundary of Littleton to a case near Baird's Mills, not far from the southeast corner of Blaine. The quarantine regulations of the provincial authorities appear to be efficient, but the great danger to be appre-

hended, I think, is from undiscovered cases, or from houses in which cases have already recovered and may have been overlooked.

"If your town is not already well protected by vaccination, free vaccination should be offered by your board, and all persons who arrive in your town from the infected parts of New Brunswick should be kept under observation until two weeks have passed since their last possible exposure to infection. All such suspects need not necessarily be quarantined, but you should arrange to be informed of the first symptoms of illness.

Yours truly,

A. G. YOUNG, *Secretary.*"

As the developments of the situation indicated the necessity of some control of the travel between Aroostook county, Maine, and Carleton county, N. B., other than to the campmeeting, the following special order of the Board was issued, but it was not promulgated until some days later.

"SPECIAL ORDER OF STATE BOARD OF HEALTH.

On account of the presence of smallpox in Carleton county, N. B., the State Board of Health deems it best to discourage all unnecessary travelling back and forth across the boundary line.

"Section 1. It is, therefore, ordered that, until further notice, no person shall come to any city, town, or plantation in Maine, from or through any places in New Brunswick between the south boundaries of the parishes of Woodstock and Richmond and the northern boundary of the parish of Andover, unless he is able to prove to the satisfaction of the local board of health of the place to which he comes that he has not been in the infected districts.

"Section 2. All persons coming to places in Maine from those parts of New Brunswick mentioned in section 1, shall immediately report their arrival to the local board of health of the place to which they come.

"Section 3. Persons violating this order will be liable to arrest and quarantine, and, as the law provides, they 'shall be punished by a fine of not more than five hundred dollars, or by imprisonment in the county jail for a period of not more than six months, or by both fine and imprisonment, in the discretion of the court.'

By order of

STATE BOARD OF HEALTH.

AUGUSTA, MAINE, August 9, 1901."

Before the promulgation of this order, it was submitted, as is shown in the following letter, to the Provincial Board of Health at Fredericton and a scheme of coöperative work was suggested to prevent the introduction of infection into Maine and reciprocally to aid the New Brunswick authorities if an outbreak on our side should occur.

"Dr. E. B. Fisher, Secretary Provincial Board of Health, Fredericton, N. B.:

Dear Doctor:—I enclose herewith a copy of an order prepared by our State Board of Health, but not yet promulgated. For the present, guards have controlled the travel on all the roads from that one which runs from Woodstock to Houlton, to that one which crosses our common boundary line, north of Mars Hill. The main reason for placing these inspectors, or guards, at the roads was to prevent persons from your side of the line attending the campmeeting in the town of Blaine. Aside from this, and after the campmeeting is closed, I think it would be well to discourage, for a while, all unnecessary visiting and travelling back and forth between our towns and the parishes on your side of the line in which cases of smallpox have appeared. I write, therefore, to suggest that you furnish me with the names of all of the county and parish health officers in the county of Carleton, and I will then forward blank certificates which they may issue to all persons who wish to come to our side, and who, in the opinion of your health officers, may safely be allowed to come. I will also instruct our health officers to honor such certificates thus issued by your health officers.

"I think that some such system as this for controlling travel when a serious outbreak of an infectious disease appears upon either side of the line would be an advantage both to New Brunswick and Maine. Having some such plan as this understood and approved in both your office and this one, we could quickly put it into operation at any time when a temporary control of travel between your Province and our State appears to be desirable. I should feel under obligation to you for any suggestions regarding the details of this proposed scheme for the temporary control of travel.

Yours truly,

A. G. YOUNG, *Secretary.*"

The propositions in this letter were cordially approved by the New Brunswick authorities and blank certificates or permits like the following, which were already printed, were sent to the health officers on the other side of the line.

..... N. B., Aug. 1901.

"This certifies that I have made a careful inquiry concerning the bearer of this, Mr., of, that he has been vaccinated and that I believe that he has not been exposed to the infection of smallpox and may, without endangering other persons, be permitted to visit any place in the State of Maine. He wishes now to go to the town of.....

(Signature)

.....

State here official position."

At the same time the following circular letter was sent to all the local boards of health in Aroostook county:

"Dear Sir:—Under date of August 9, the State Board of Health made and adopted the Special Order, copies of which I send in this, but its promulgation has been delayed while making arrangements with the Provincial Board of Health and with the health officers of Carleton county, New Brunswick, for coöperative action.

"Though the measures which have been adopted by the officers on the other side of the line are very satisfactory, so far as can be learned about them, it is undoubtedly best to discourage and restrict unnecessary travel between Carleton county, N. B., and this State a little longer.

"Arrangements have been made with the health officers of Woodstock and of Carleton county to issue certificates to persons who wish to come over on our side of the line. You are advised, therefore, to honor certificates issued by the following members and agents of the boards of health of the city of Woodstock and of Carleton county:

(Names here followed).

"If, unfortunately, we should have an outbreak of smallpox, or of other dangerous infectious disease in any part of Maine, the State Board advises and hopes that our local health officers may promptly and cordially coöperate with our neighbors across the line in helping them to exclude infection from their territory,

as they now do for our safety. It is probable that this present arrangement will be needed for only a very short time.

"I enclose copies of the special order of August 9, under which your local board had authority to take such action as you may deem necessary if suspects should arrive from the infected district without certificates.

Respectfully yours.

A. G. YOUNG, *Secretary.*"

August 19. As the false reports in Houlton and in some of the towns north of there in regard to the nature of the disease on the New Brunswick side were making much trouble for the local officers in our towns, Dr. George E. Washburn of Augusta was sent by the Board to make a personal investigation of the nature of the disease, and with the consent of the local health officers, to learn the conditions relating to quarantine, etc. The doctor was cordially received by the health officer of Woodstock and of other places and he personally saw and examined a large number of the cases. His report indicated that the disease was unmistakably smallpox though, in most of the cases, it assumed a mild form, and further that the methods of the local authorities on the other side were intelligently planned and as efficiently carried out as was practicable.

The situation was still more complicated by the fact that a second campmeeting had to be reckoned with. At the second visit to Houlton, the secretary had a conference with the managers of the campmeeting which was to be held in Littleton, and, as was true of the campmeeting in the town of Blaine, a large number of people usually came from the other side of the line, and it was deemed best by the management to postpone this campmeeting two weeks and then to see what the situation might be. The State Board hoped that further postponement might be arranged, but the management did not deem it convenient or practicable to do so. As the number of smallpox cases had increased to about 65, it was deemed necessary to issue a third special order which was in these words:

"On account of the continued presence of smallpox in some places in Carleton county, N. B., it is hereby ordered that persons from New Brunswick shall not come to the campmeeting to be held in Littleton on the grounds of the Aroostook Campmeeting Association.

"Persons violating this order will become liable to arrest and quarantine, and, as the law provides, they 'shall be punished by a fine of not more than five hundred dollars, or by imprisonment in the county jail for a period of not more than six months, or by both fine and imprisonment, in the discretion of the court.'

Per order,

STATE BOARD OF HEALTH.

AUGUSTA, MAINE, August 20, 1901."

A third visit was made to Houlton, to Littleton and Monticello August 30, the day of the beginning of the yearly campmeeting in Littleton. The same arrangements of a special inspector or detective at the campmeeting grounds were made as at the other campmeeting. Among other business preformed was an arrangement whereby lambs from New Brunswick might be driven to Houlton and arrangements for the holding of the fair of the Aroostook Agricultural Society were made. In Monticello, the postmaster stated that letters had come to persons in his town who had relatives in the infected district in New Brunswick and presumably written in infectious houses. The Secretary of the State Board made proper representations of the matter to the health authorities on the other side and they promptly secured regulations which obviated dangers of that kind.

This outbreak of smallpox was a serious danger to our own towns for the reason that it had existed for several weeks before the health authorities knew of its existence, and that the business and other associations back and forth across the line are very intimate. Nevertheless not a single case appeared on our side of the line. Much credit is due to our local boards for their efficient work, and it is a pleasure here, publically, to thank the Provincial and local health officers of the other side for their hearty coöperation in doing what they could to help us while working to protect their own people.

Near Patten.—Word was received from Patten August 28 that some kind of a disease existed in some of the lumber camps near Grand Lake forty miles or so northwest of Patten, and that the trouble was rumored to be smallpox. On one of the visits to Houlton, (August 29) the Secretary of the Board went over to Patten to see the persons who had heard the story, but no decisive information was available. As it was not deemed

advisable to take any action which might be construed as confirming what was probably a false rumor, a young man capable of taking care of himself in the woods, and who could be depended upon to keep his mouth closed, was instructed so that he might be trusted to observe and to make a preliminary diagnosis at least. Carrying his pack and tramping from eight to twenty-one miles a day, and sleeping in the open two nights, he visited every camp and saw all of the men, though the persistence with which he was dubbed a game warden made his reception in some of the camps not entirely cordial. No eruptive disease of any kind was found. That which apparently gave rise to the rumor was the illness of one or two men with typhoid fever.

Portland.—There were four cases of smallpox in Portland during the year which were reported to the State Board and regarding which Dr. Smith, President of the State Board, furnished information which was useful in aiding other local boards of health to guard against sources of infection which the histories of the Portland cases indicated might exist.

Rangeley.—No cases of smallpox occurred in that region, but September 23, while in Farmington, one of the physicians of that place showed a letter which was written from that town and which mentioned a "new" eruptive disease from which one person had died, and from which the writer was apprehensive of danger to other persons. The town was visited on the next morning's train, but it was found that this was one of the wild-goose chases in which the health officer has to indulge occasionally in carrying out his policy in taking no chances with a rumor of events which if true portend danger. The only ground for the rumor was a death from hemorrhagic purpura which had occurred a few days before.

Benton.—On the 4th of November, at the request of Dr. Shaw of Clinton, the secretary visited that part of Benton adjoining the town of Clinton, to see a family in which a suspicious eruptive disease had appeared. Three members of the family, young adults, were affected with an eruption which, though profuse, was diagnosticated provisionally as chickenpox, but as a positive diagnosis was then not possible, temporary quarantine was advised. The family had a work on domestic medicine, and had been reading up on the symptoms of smallpox and chicken-

pox, and consequently there was some doubt whether a straight and truthful statement in regard to the period of invasion was obtained. The history which was got was not that of smallpox, and yet the eruption was quite atypical for chickenpox. Arrangements were made for Dr. Woodcock of Bangor, to see the cases two days later. He deemed the cases probably chickenpox, but thought that there was a sufficient degree of doubt to require quarantine and disinfection.

These cases and the one in Monson are good illustrations of the atypical cases which sometimes make a positive differential diagnosis between smallpox and chickenpox extremely difficult and sometimes impossible.

Protective Measures against Smallpox in St. John, N. B.—Early in November, it was learned that smallpox was threatening to assume an epidemic form in the city of St. John, N. B. As most of the passengers entering our State at Vanceboro are through passengers to other states west of ours, the State Board of Health has always thought the expenses of any inspection service at that point should be borne by the general government. November 9, the nomination of Dr. M. L. Young of Vanceboro, as inspector was telegraphed to the Surgeon-General of the Marine Hospital Service at Washington, with the request that he be appointed, but, at the same time, the Board did not deem it safe to wait for the appointment from Washington, and a letter was sent to Dr. Young asking him to go at work at once temporarily as an inspector for the State board of health. About the first of December, the Marine Hospital Service assumed the responsibility and the expense of the inspection service at that point.

Early in December, the Marine Hospital Service, at the request of the State board of health, also took charge of the inspection service at Eastport, which the local board of health of Eastport had, for some time, been carrying on, but which was more equitably an expenditure by the general government.

Hallowell.—December 14, at the request of Dr. Crooker of Augusta, a suspicious case was seen in the city of Hallowell. The case was that of a girl of fourteen, who had a very unusually profuse eruption for chickenpox. Yet, that was what it appeared to be. The local board of health was notified, and the

house was quarantined temporarily. The patient was to have been seen again the next day, but in the meantime the severe winter freshet which occurred at that date, made it impossible to reach the house. On the second day the rapid desiccation of the first vesicles, and the presence of successive crops of them facilitated the diagnosis of chickenpox.

SUBJECTS OF CORRESPONDENCE.

Hitherto it has been the policy in making up the report of the State board of health to avoid filling space with the ordinary correspondence of the office, but it is now thought that the introduction into this report of some of the letters which have been written in answer to inquiries on many subjects may be useful to other persons, and particularly to local boards of health to whom letters are often practically duplicates of those already many times written to other local boards. The subjects which have been touched in this correspondence are, for convenience of reference, arranged topically so far as is easily practicable.

ENQUIRIES ABOUT LABORATORY WORK.

Answer to an Enquiry from Outside the State.

In answer to your communication of the 5th, I am obliged to confess that the State of Maine is the only one of the New England State whose State board has no laboratory facilities. A bill was presented to the last legislature providing for the establishment of a chemical and bacteriological laboratory, but the spasm of economy which was sweeping over the State at the time made it expedient to ask the committee which had the bill in charge to refer it to the next legislature. We hope that the legislature of the coming winter will make the necessary appropriation for the establishment and running of the laboratory which we need so much.

Help Needed in a Diphtheria Outbreak.

It isn't a very creditable condition of things in this State when there are no facilities found for making the bacteriological test to determine whether the suspected case is or is not diphtheria. That appears to be the case this morning. Immediately upon receipt of your letter and specimen, I telephoned to Dr. Campbell of this town. He had no fresh tubes to send to you. I then

telephoned to Dr. Bessey of Waterville. He was away on his vacation. Dr. Whittier of Bowdoin College, I think, is away. I have written to Dr. C. D. Smith of Portland, but I am afraid he can not do the work for you now. I have asked him to send you a tube for making the culture if he can do the work. It would not be much use to make an examination of the sample which you sent as it has been on the road over Sunday. By the time arrangements are made, you probably will not need to have the examination done. The fact that we haven't a bacteriological laboratory to help you doctors and local boards of health is really disgraceful to the State.

Bad Water.

Help asked.—We have just had a well drilled, and the water is not good. When first pumped, the water is as clear as crystal, but after it stands a half day it turns to a reddish color, then it becomes clear with the settling of the sediment. A greasy scum seems to rise to the top. Can you have the water analyzed for me?

Answer.—I am sorry that it is impossible for me to have the sample of water analyzed for you. For the present, the State board of health has no facilities nor arrangements whatever for doing work of that kind. It is to be hoped that the next legislature will establish a laboratory so that bacteriological and chemical work of many different kinds can be done for citizens of the State when questions of health or healthfulness come up.

I do not know, but from what you say, I should guess that the trouble may be iron in the water which is soluble and invisible when the water is first drawn, but which, upon exposure to the air, becomes oxidized and falls as a sediment. The grease which you speak of upon the surface of the water, may it not possibly come from the galvanized iron pipe? When the water is drawn or flows through galvanized iron sometimes it has a very slight scum upon the surface after it stands some time. The scum is usually very light and filmy and might be mistaken for grease.

Food Supplies.

This Board has never published anything relating to the violation of food laws for the reason that the laws of that kind in this State are of but little value, and there is no provision for any official inspection of foods and beverages.

Analysis of Water.

I am desirous of obtaining an analysis of two samples of water which we have, they being of doubtful purity. Is service such as this rendered by the State board of health?

I should also like to learn the nature and effect a certain substance has which appears each year in our ——— lake. About this time of year, perhaps a little earlier, there is seen along shore myriads of little green globules or floating particles, slimy to touch, which float about in dense masses driven by the wind or current. One observer has called them a species of vegetable growth.

Answer.—I am sorry that the State board of health is unable to have the analyses done for you. At the present time we have no facilities or arrangements whatever for doing work of that kind. We hope that the next legislature will establish a laboratory in which the many kinds of bacteriological and chemical work so frequently needed in the health interests of the people of the State may be done without cost to them.

The substance in ——— lake of which you write is undoubtedly some one of the fresh water algæ. Some of the fresh water algæ have given considerable trouble to the public water supplies of some cities by growing in excessive quantities and after decomposing, communicating disagreeable odors and tastes to the water. The growth which you mention may or may not be of the kind of algæ which have given trouble, and in your ——— lake it probably has never occurred in objectionable quantities. If, in any subsequent year during warm weather the growth should be noticeable, I should be glad to receive a sample of it enclosed in a three or four ounce bottle and sent as promptly as possible after it has been collected. I may be able to identify it or at least tell you to which class of algæ it belongs.

Request from Connecticut for an Analysis. A summer visitor in Maine.

Answer.—I regret very much that this Board is unable to have the analysis of the sample of water done for you. We were able for quite a while to have some work done in this direction. It was done in connection with the office and under my personal supervision, but the increase in the work of the office very often necessitated the keeping of applicants waiting a long while. This was, of course, unsatisfactory to them, and very much so

to me. We felt obliged, therefore, a year ago or more to discontinue work of that kind. The insufficiently equipped laboratory has been dismantled. We hope that the next legislature will make an appropriation to establish a well equipped hygienic laboratory in the care of a director who may give his whole time to work of that kind.

Lead Poisoning Feared, the water coming through a lead pipe.

Answer.—The State board of health has now no facilities whatever for the examination of samples of water. I regret that we are unable to do the work for you. I hope that the next legislature may provide a laboratory for work of this kind.

I would suggest that before taking any water for use, you pump out a pailful or two, and throw away, thus avoiding some of the danger which may be possible in the action of the water upon the lead pipe.

Question of the Pollution of a Well.

If you can show that a well is polluted by a neighboring privy you may be sure that in the language of section 7, IV, page 3 of "Abstract of the Health Laws," you have "a condition which is detrimental to life and health." It therefore constitutes a nuisance against which local boards of health have authority to act.

If, however, a case of this kind should go to the court it might, without the help of a laboratory, be difficult for the local board of health to prove to the satisfaction of the court that the well was polluted by matter from the privy vault. I would, under our present circumstances advise all local boards of health to act rather cautiously if the owner of the well refuses to abate what the local board of health deems apparently a nuisance.

POWERS AND DUTIES OF LOCAL BOARDS OF HEALTH.

Organization and Records.

Question.—After the appointment of our local board of health, we held a meeting of the board and made choice of one member as secretary which was recorded in the plantation records. Now, is that all that is necessary, or must we appoint one as chairman?

Answer.—As secretary of your local board of health you should have some kind of a blank book in which you can make your new records. You should choose a chairman as well as a

secretary. The chairman would, of course, be the presiding officer at your meetings, although you can of course, talk over and arrange matters informally at your meetings and can agree among yourselves as to what should be done, and it does not make much difference whether one of your members is a chairman or not, but to make the organization of your board strictly legal you should elect a chairman as well as a secretary, and record every election in your book as well as other actions which are taken by your board, particularly those which are of much importance, or may possibly come up again in the future.

To Chairman of Board of Selectmen.

In answer to your inquiry, I would say that under the provisions of sections 8 and 9, on page 3, of "Abstract of Health Laws," I think that a local board of health has authority to require disinfection without a certificate or a notification from the attending physician, and that under section 18, any local board of health may direct the destruction of articles which they feel sure have been exposed to infection.

In regard to the exercise of this power of destroying articles, it should, of course, be exercised as infrequently as possible, and should be limited to those articles the destruction of which appears to be really necessary to guard against the danger of further infection. As I have understood the law, a town is under no obligation to pay for infected articles destroyed by order of a local board of health, although somewhat frequently, I think towns have, as a matter of equity, reimbursed the owners in part for the property thus destroyed.

The mere fumigation with formaldehyde, with sulphur, or anything else will not suffice for the safe disinfection of all the articles usually found in infected houses, and in the rooms which have been occupied by infectious persons. With the proper facilities for disinfecting work, it is rarely necessary to destroy articles, but, unfortunately, in some towns local boards of health are not provided as they should be with the means for disinfecting.

I think that under the paragraph of the law at the bottom of page 2, of "Abstract of the Health Laws," you will see that local boards of health have ample authority to furnish medical treatment and care for persons sick with such diseases, who cannot otherwise be provided for. I presume that if the fami-

lies thus provided for are amply able to pay for the services of a nurse, they may, and should be, required to do so.

Pay of Local Boards.

Answering your inquiries, I would say that the law does not state what compensation shall be paid to members of local boards of health but in most towns they receive a *per diem* compensation which is usually the same as that which is received by the municipal officers. That is \$1.50 in most of the towns, I think. If I were in your place, I would make out an itemized bill for services and present it to the municipal officers.

Assistance to Quarantined Families.

As regards the authority of a local board of health to render assistance to a quarantined family, I would say that your local board of health can furnish medical treatment and care for persons sick with infectious diseases who cannot otherwise be provided for. During their quarantine, if the family is in want of provisions your local board of health can furnish such necessities as you deem it necessary to supply them, at the expense of the town.

If the members of the family are already paupers, I presume the proper method of supplying them would be by notifying the overseers of the poor, although in cases of that kind, I presume your local board would have ample authority to furnish supplies if they do not come promptly, or when they are needed.

Furnishing Diphtheria Antitoxin.

There is no explicit provision in the law for paying the expenses of using antitoxin; but under the provisions of section 7, paragraph III, page 2, of "Abstract of the Health Laws," local boards of health may authorize the attending physician to furnish diphtheria antitoxin to families who cannot themselves pay for it, and rather than to have children die for the want of it, every local board of health should, I think, order it to be used at the expense of the town for those "who cannot otherwise be provided for," as the law states it.

The Breaking of Quarantine, etc.

The secretary of a local board of health writes that at the end of two weeks from the time the children were taken with scarlet fever, the parents claimed the right to send them to school or to send them anywhere else. This family had been very stubborn.

A young man also claimed that he had a right to go to school directly from a house in which there had been cases of scarlet fever.

Answer.—Replying to the questions of yours of April 3, I would say that your local board of health has ample authority under section 14, page 4 of "Abstract of the Health Laws," and under the general definition of the powers and duties of local boards of health in section 7. III, page 2, to give orders in any of the matters in regard to which you write, and to enforce obedience.

After the period of desquamation is completed pupils may be readmitted to the schools at any time deemed proper by the local board, and not before then, and before re-admission, pupils and parents must observe the precautions in the way of disinfection and otherwise which may be required by your local board.

After a child has ceased peeling he can be admitted to the schools at any time after a thorough and trustworthy disinfection has been done, and there are no further sources of infection to which he is exposed. But the period of desquamation is not usually fully ended when the parents think it is. The only safe rule is to wait until the palms of the hands and the soles of the feet are smoothed off. These are the parts where the process of peeling is completed later than elsewhere.

If that young man is unreasonable or stubborn, and does anything to endanger the public, simply get out a warrant, and bring him before a trial justice. As I understand, you have not yet released him from quarantine, or, at least, not fully released him. He is bound to abide by your decision as to when it will be safe for the school to have him re-enter it. The period of incubation of scarlet fever, that is, from the time the person is exposed to infection (the last opportunity) until they come down with the disease if they are going to, need not be considered longer than seven or eight days. See Circular 53.

Disinfection.

As to the power of the local board of health to enter houses for the purpose of disinfecting or supervising the disinfection, I would say that it is hardly worth while to raise that question for the law provides that the disinfection shall be done to the satisfaction of the health officer or board of health. Section 8. If you do not know just how the disinfection has been done you

cannot very well be satisfied that it has been done efficiently. The best way for the local board of health to assure itself that the disinfection has been trustworthy is to have the work supervised either by a member of the local board of health, or by some person who knows how the work should be done, and who can furnish the local board with the required guarantee.

Acceptance of Physicians' Reports.

If a physician reports a case of infectious disease to your board it is best for your board to assume that the report is made in good faith, and that there is no need of calling another physician to verify the diagnosis. The doing of that would be offensive to the first physician, and there would be trouble at once.

The law provides that a physician shall make his report to the secretary of a local board of health or to the health officer when there is a health officer. In most towns there is no health officer. If you have an understanding between the different members of your board that each member shall either forward immediately to the secretary the notifications, or that each member shall look after the matters in his own quarter of the town, it is hardly worth while to quarrel with the physician if he notifies some other member than the secretary. I would, however, advise you to arrange it so that it would be most convenient for you, and if you require physicians to report directly to the secretary, ask them to do so.

Quarantine against a Neighboring Town.

I am not sure that your local board of health would have authority to quarantine against a neighboring town, or to prohibit the holding of public dances in your town. Although the law is not explicit on that point, my opinion would be that if your local board of health deemed it necessary for the protection of your town against a dangerous disease to do so, that the courts would uphold you if the case should come to the courts. I do not, however, deem it advisable for one town to quarantine against another, unless the neighboring town fails very plainly to do its duty in preventing the spread of the infection, and the local board of the first town has good grounds for believing a quarantine to be very necessary.

If you are quite sure that infectious persons come to the dance from the neighboring town, your local board of health can forbid such attendance from the neighboring town, and then if you

have good reason to believe that infectious persons come, isolate or quarantine such persons, and order the owner of the hall in which the dance is held to disinfect very thoroughly and to the satisfaction of your local board. See paragraph 3 of section 7, and sections 8 and 9 on pages 2 and 3 of "Abstract of the Health Laws."

Kindly let me know what town you refer to so that I can see whether they have reported to this office. If necessary, I will call for a report from them as to what they are doing.

Closure of Schools and Churches.

I am glad that you are doing your utmost to stamp out the outbreak of scarlet fever. In regard to the legal authority in the hands of your board, I would say that it is ample for any emergency which you would be likely to have.

The power to close schools and churches is not expressly stated in the act which defines the powers and duties of local boards of health, and so far as I know, no court has given a decision on this point.

When it is deemed necessary to close the schools temporarily on account of the presence of infectious diseases, it is better to confer with the school officers in regard to this matter. They have full authority to close them when they deem it necessary. Schools are often closed when there is no real necessity for it. Sometimes when there has probably been a large number of pupils exposed to infection, it is well to close them for a period equaling that of the incubation of the disease in question. A week usually covers the period of incubation for both scarlet fever and diphtheria. The most efficient means of excluding infection from the schools is the prompt exclusion and quarantine of all infectious pupils. Proceed as is provided in sections 19 and 20 on page 5 of "Abstract of the Health Laws."

DESTRUCTION OF PROPERTY.

To a Local Board.

I write this to caution your local board of health not to order the destruction of property of any kind unless there is a real need of it, for the reason that if the town does not pay the bills, the owner of the property does not feel very well about it, and sometimes when the town pays it many people are dissatisfied at the

cost to the town. Just so far as it is possible to disinfect articles in a trustworthy manner they should be disinfected and not burned. All of the articles of this kind can be disinfected efficiently if the local board has the appliances for the work. A portable steam disinfector such as is described on page 6 of Circular 68 would do the work well and would cost not more than one-fifth of what Mr. ——— says was the value of his personal effects which were destroyed. Of course, under some circumstances it may be cheaper to burn some things which are almost worthless than to disinfect them, and the owner is better off without them than to have them about when there is danger that they have not been thoroughly disinfected.

Towns are not obliged to reimburse persons for the destruction of property destroyed by order of local boards of health.

Smallpox House.

Do not of your own act or the act of your board apply the torch to anybody's house, even if it is extremely dilapidated and apparently worthless. If the house belongs to the town do not burn it, unless the municipal officers distinctly authorize you to do so. If the house is loose and full of cracks and holes it perhaps would be impossible to disinfect it thoroughly with formaldehyde or in any other way. If the municipal officers think the building is of value, board it up so that no person may enter it, and disinfect it again when it comes warm weather. The disinfection then would be much more efficient than if done in cold weather. If then you wish for instructions how to disinfect it, I will write to you again.

A Fiftly Dilapidated House.

It was asked whether the local board of health should burn a house which was apparently worthless, and in which a man died of cancer some years ago. He was taken out, and the house was left just as it was with all of the soiled bedding and other articles.

Answer.—Answering your enquiries I would say first, do not burn the house. If the house is of but little value and it is deemed best to burn it let the burning be done by the owner or owners, or with the written consent of the owners. If any reimbursement is to be paid have a very plain understanding with the municipal officers what they are to pay.

If the house is of little or no value you can work under sections 8 and 9, on page 3 of "Abstract of the Health Laws." You can prescribe a method of disinfection and cleansing which you may deem necessary and deem sufficient to put the house into a condition so that it may again be inhabited. This process of disinfection might cost more than the real value of the house so that the owners would prefer to burn it.

If the owners think that it is of value and refuse to burn it and fail to disinfect it in accordance with the instructions of the local board of health, you can proceed under section 21, on page 6 of "Abstract of the Health Laws," and if you deem it best to do so, you can explain to the owner or owners that if the house remains in a filthy condition and unfit to be occupied as a dwelling place, that your board will be compelled to have it remain vacant.

The advice of the State board of health to local boards has always been to avoid the destruction of any articles or any property which may be of value, or which the owners deem of value.

QUARANTINE.

Establishing and Raising Quarantine.

The secretary of a local board of health, referring to the fact that Form 7, for weekly reports for infectious diseases, calls for the number who have recovered and the number who have died, states that the physicians did not report these facts to him, and consequently he is unable to report them to the central office.

Answer.—Answering your questions I would say that when a case of infectious disease,—smallpox, scarlet fever, or diphtheria, for instance,—is reported to your local board of health if it is quarantined, as it should be, the quarantine is placed by your local board of health. Nobody else has any authority to quarantine and nobody else has any authority to raise the quarantine. Consequently, if the work is done as it should be you cannot fail to know when the person with an infectious disease has fully recovered, has been disinfected, and has been discharged from quarantine.

You should insist upon the quarantine of these infectious cases, that the quarantine be carried out under the authority and in accordance with the directions of your local board of

health, and that it is not raised until your local board or you as the executive officer have given your permit to have it done. If any difficulty, or any points in which there is doubt come up, I should be glad to hear from you.

In cases of typhoid fever an absolute quarantine and the placarding of the houses has not thus far been advised by the State board, and consequently you may have more difficulty in knowing when the sickness has terminated. The proper course to pursue with cases of typhoid fever is shown in Circulars 46 and 53.

Length of Quarantine, etc.

Among other questions, a householder asks: How long must a family be kept in quarantine after being fumigated?

Answer.—I answer your enquiry by sending the following copy of a letter recently written in answer to an identical question.

"After a house has been quarantined or placed in isolation on account of cases of infectious diseases within it, suspected cases, or on account of infection which may develop cases, the persons who are in the house must obey quarantine rules and regulations until the quarantine is raised, irrespective of disinfection, or fumigation, as you call it.

"Sometimes when persons, or rooms, or clothing have been exposed to infection, the local board of health might deem it best to have the disinfection done at once. In that way, by removing the infection, the persons in the house would be less likely to contract the disease. In some of these cases the local board might deem it necessary to keep the suspected persons under quarantine, or under partial quarantine, or under observation until they assured themselves that there is no danger of their taking the disease.

"Of course, with no statement from you in regard to the conditions or circumstances in your case, I am unable to give you any definite answer. The best way will be for you to confer with your health officer in regard to what is really necessary for you to do. It is altogether unlikely that he would wish to keep you under quarantine a day longer than his local board deems absolutely necessary."

Quarantine and Disputed Diagnosis.

Question.—A man who kept a country store and lived on the floor above the store, had a disease in his family which was

reported by the attending physician as scarlet fever, but which had been called measles by another physician. The householder wrote to the secretary of the State board of health about the matter.

Answer.—Whether the case in your house is scarlet fever or measles, the local board of health has authority to make such arrangements regarding the isolation of the patient and of the household as may be deemed necessary to prevent the spread of infection. Even if there has been considerable running in and out of your house, there was no good reason for permitting the chance for the spread of infection to continue.

I am, however, sorry to have the quarantine or isolation arrangement any more severe than is absolutely necessary. It is a part of the policy of the State board to advise local boards of health to make quarantine, when it is necessary to establish quarantine, just as little troublesome as is compatible with the safety of the public.

I have written to Mr. ———, asking him whether some arrangements may not be made so that you may carry on the business in your store. It may be deemed safe to make some such arrangement for you, but the local board must be the judges in the matter.

Under the present circumstances regarding the danger from smallpox in this part of the State, I should not be justified in coming to your place as you request.

Quarantine of Suspected Cases.

To a Health Officer.—The authority of a local board of health to quarantine cases temporarily when they are suspected to have an infectious disease, or when it is suspected that they have been exposed to infection is perhaps not distinctly defined in the law, but I have no doubt that when local boards of health believe that persons either have a dangerous infectious disease or have been exposed to the infection of such a disease, it may take such reasonable precautionary measures, including quarantine temporarily at least, which may be deemed necessary to guard the public against danger.

I think that authority to do this may be found in section 7, III., page 2, of "Abstract of the Health Laws": "To guard against the introduction of contagious and infectious diseases, by the exercise of proper and vigilant medical inspection and

control of all persons and things coming within the limits of its jurisdiction from infected places, *or which for any cause are liable to communicate contagion.*"

Scarlet Fever.

Question.—Will you kindly inform me whether a man whose house is quarantined for scarlet fever is allowed to attend to his usual duties, such as waiting on customers in a store, or whether he must remain in his house?

Answer.—The instructions which have repeatedly been given by the State board of health to local boards, are that the first consideration shall be the protection of the public, and that the next shall be that the persons quarantined shall be inconvenienced just as little as is compatible with public safety. If a man in whose family there is a case of scarlet fever lives upon a farm, he may, of course, receive permission to attend to his own work upon his own premises, meanwhile not visiting other houses so as to endanger other persons.

If, on the other hand, the head of the family in which there are cases of scarlet fever works in a factory, is a school teacher, a postmaster, or a merchant, so that his vocation would bring him into association with many other people, he cannot, of course, safely be given so much liberty. If, however, a merchant whose house is infected, will undergo a thorough disinfection, and then put on clothing which is not possibly infected, then board temporarily somewhere else rather than in his own home, he could be allowed to attend to his duties at his store.

NUISANCES.

Nuisances from Fish Offal.

A complaint came from one of the coast towns that the offal of the ——— Fish Co. is dumped from their wharves into the harbor, and that, at low water, a very bad odor is the result and that there is danger of creating sickness. The local board was asked to investigate and to report.

The local board of health confirmed the fact of the dumping of the offal into the harbor, but was in some doubt as to their jurisdiction in the case.

Answer.—I cannot give you any specific directions in regard to how you should deal with that complaint against the ———

Fish Co., further than to remind you that it is the duty of your local board to determine, in the first place, whether in its opinion a nuisance exists, and, in the next place, to determine whether the nuisance, if one exists, is such as comes within the jurisdiction of a local board of health. Turning to paragraph IV. on page 3 of "Abstract of the Health Laws," and to section 16 on page 11, you will see that those nuisances which come under the authority of local boards of health are such as are "dangerous to life and health," "detrimental to life and health," or such as come from "sources of filth or other cause of sickness found on private property." Your action or non-action in the case should depend upon whether the condition complained of endangers the public or individuals. If the nuisance does not fall within the class to which I have referred, your board does not, of course, wish to commit itself by taking action in the matter.

It seems to me that the practice of the ——— Fish Co. in dumping the fish offal into the water is faulty and not to be commended. Could they not make arrangements for having it carted away and disposed of in a compost heap? The product would be valuable for agricultural purposes, and I should think that some of the farmers and gardeners in the locality would be very glad to have it and to bear a part of the expense and trouble in disposing of it in that way. I would suggest that you confer with the company about the matter, and see whether some such arrangement could not be made.

Fish as a Fertilizer.

Question.—There is a farmer here who hauls decaying fish from a wholesale fish market in Bangor and spreads it upon the fields. The stench is sometimes horrible and several of the neighbors have made a complaint to him, also to the local board of health. The nearest family have had a case of sickness within a few days which the doctor says is typhoid fever.

Answer.—Fish hauled out, as you state in considerable quantities, upon land near dwelling houses constitutes a nuisance such as would be detrimental to the health of persons living near the field upon which the fish is spread and thus coming within the jurisdiction of your local board of health. Serve upon the person who is at fault a written notice by filling out Blank 10a. If he does not then, within the time which you give

him, plough under or otherwise render inoffensive the material which causes the nuisance, consult a lawyer in regard to the exact steps which you shall take,—whether it is best in your particular case to proceed under section 26 on page 7 of the "Abstract of the Health Laws," or under section 16 on page 11. If you cannot get legal advice near home, let me know.

Written Complaint.

Question.—The local board of health say that they cannot act upon a nuisance until they receive a written official complaint. Will you please tell me whether such written complaint is necessary to enable the local board of health to act? (The question related to a nuisance which was supposed to have had something to do with a serious outbreak of diphtheria.)

Answer.—Whenever a local board of health has knowledge of a nuisance or condition which is detrimental to health in its town, it is its duty to act and to cause the removal of the nuisance if practicable, irrespective of how it comes in possession of the knowledge that such conditions exist. It need not, and should not wait until they receive a written complaint, or any complaint. In several cities a sanitary inspector is at the service of the local board, and it is the duty of the sanitary inspector to be on the lookout continually for nuisances and to order their abatement. That is the arrangement in this city. In many towns, and I think the most of them, the local board of health proceeds to arrange for the abatement of the nuisance without awaiting a written or formal complaint.

Do not, however, place too great an emphasis upon local conditions, so much so as to overlook the fact that diphtheria is almost always due to infection transmitted directly or indirectly from one person to another, irrespective of the surroundings or sanitary conditions, and that although unfavorable sanitary conditions probably do act to some extent as an auxiliary in the causation of outbreaks of diphtheria, the infection is the one indispensable cause. I send a copy of this letter to your local board of health.

To a Citizen.

A complaint was made that the drainage from a neighbor's lot rendered his cellar unfit for the keeping of vegetables or other food supplies.

Answer.—The matter about which you wrote to this office some time ago has been referred to your local board of health. If the nuisance is one which affects only the value of your cellar for keeping vegetables, the local board of health has no jurisdiction in the matter, but if the drainage from these places into your cellar creates a condition which is prejudicial to the life or health of your family, your local board of health have authority to order the abatement of the nuisance.

School Nuisance.

At our annual March meeting, it was voted to move the out-buildings nearer to the school building. They are now only twenty-seven feet from the back corner of the school-house. One member of our school committee wants them attached to the wood-shed which would bring them about seven or eight feet from the school-house. I think it ought not to be done, and I would like your opinion on the matter.

Answer.—If the school privy is about twenty-seven feet from the back corner of the school-house, it should be moved farther away instead of nearer. If moved nearer, it would become a serious and dangerous nuisance. That I know would be the advice which would be given by the educational department as well as by this office.

Personal Uncleanliness.

Between the towns of ——— and ——— there is an island in the ——— River upon which lives a lone woman. She is said to live in a filthy condition. Complaint has been made to the board of health that she is a nuisance and the selectmen have requested us to look into the matter. There are only two places on the main land at which she visits and one of them calls her a nuisance. I would be pleased to receive any advice or instructions from you as I do not know how to act.

Answer.—From what you write, I should judge that that woman who lives upon the island does not constitute a nuisance such as local boards of health have authority to suppress.

If she is probably sane, and not destitute and suffering, and is not living and acting in violation of the laws of the State, I do not know that there is any good reason for any authority or officer to take action in her case. If she is suffering on account of destitution, and it can be shown that she is a resident of

_____ or _____, it would be the duty of the selectmen to take action in her case, or if she is insane action should be taken. I would advise your local board to take no action in the matter.

Lack of Drainage.

Question.—I have built here and it seems I cannot get drainage for my cellar. There is one and one-half feet of water in my cellar and the man owning the land through which I should have to cross will not let me do so. I have tried to buy a right, but he will not sell. The local board of health does not know what to do. Have I got to live over that water?

Answer by Mr. Jordan.—I am in receipt of your letter in regard to the trouble that Mr. _____ has in regard to water in his cellar.

In a city adjoining owners object to creating an easement of drainage across their land but good neighbors do so subject to being revoked or changed when other opportunities occur, or conditions of building on the adjoining lot require it.

In the country a neighbor would rarely have a good reason not to accommodate in such a matter but he is not obliged to.

If there is a highway in front of him he might dig to it and then dig right or left until he got below his cellar in a highway gutter. If this is not possible he should cement around the outside of his house and try to keep the water from getting into his cellar. All storm water has a right to run off on the natural slope of the land. His only other method is to fill his cellar to the level that water stands and if he wants more cellar depth he must raise his house. If there is an opportunity to drain through by means of a drain in the street gutter, the selectmen and board of health ought to co-operate but it can be lessened a great deal by proper grading around the house. I am sorry for Mr. _____.

A Sewerage System Needed.

We need a system of sewerage for our town. Some of our streets are suffering now from the sink-spout curse and we want to know how to remedy the evil.

Answer.—Referring to your letters of May 23 and May 25, I would say that your local board of health has no authority to build sewers or drains for your town. You can, of course, use your influence with the town and municipal officers to have

sewers built whenever such work is deemed necessary by your board.

The best way for your town to do will be to engage a competent engineer to lay out a system of sewerage for your village. The plan of it need be only a simple and not expensive one, and by taking care of the surface water upon the surface, letting it flow as it has hitherto, or through cobblestone or other surface gutters. An engineer who has had experience in this kind of work can tell you pretty accurately the cost of excavating and back filling, and after you have determined the size of the pipes required and the length of the lines, you can determine the cost of the sewer pipe after obtaining a copy of the catalogue of the Portland Stoneware Company, Portland, Maine.

I enclose two copies of the *Sanitary Inspector* which will be of use to you. If you think that I can aid you any further, please let me know.

Building a Sewer Past a Well.

Question.—It is proposed to put a sewer from a house to the main sewer to drain two water-closets in a double tenement house. It is intended to run the sewer within seventeen feet of a well about twenty feet deep from which twenty or more families get their water supply. Will you kindly advise what kind of pipe is the safest to use?

Answer.—The proposed sewer runs so near the well that unless it is dug through impermeable clay the well would be sure to be polluted sooner or later. The nearness or remoteness of the time of pollution depends upon the character of the ground. Glazed sewer pipe, even if carefully cemented, would not be safe for the portion of the sewer near the well. I should say that from 50 to 100 feet of the pipe should be cast iron, put together carefully with leaded joints. One hundred feet would be better than 50 feet, particularly if the ground near the well is quite permeable. If only 50 feet of iron pipe are put in, another 50 feet of glazed pipe on either side of it should be very carefully cemented.

Nuisances for Want of Sewer.

Local boards of health are not authorized to build or repair drains or sewers. That matter lies wholly with the municipal officers.

A local board of health may perhaps have authority to forbid a householder to run his sewage into a street gutter or an open drain so as to produce a nuisance, but when a city refuses to construct a proper sewer for the receipt of the sewage, a local health officer, who is a servant of his municipality, might in some cases find it hard to order the abatement of such a nuisance when the city does not make it practicable or reasonably easy to abate it. I will write to Dr. ——— about the matter, and I would advise you and others who think as you do to lay the matter properly before your city government.

Can One Member of Board Act Alone?

Answer.—In the abatement of a nuisance, the secretary of a board can send the preliminary notice on Form 10, signed only by himself; or he can, if he chooses to be less formal, have a neighborly talk with the offender. If, however, obstinacy is shown, and a second notice is sent out, Form 10a should be used, and should be signed by at least two members of the board.

Sewage Nuisance.

Your sewage nuisance may give you some difficulty unless the town will put in a public sewer. If you have notified the persons who are at fault, using preferably Form 10a signed by at least two of the members of your local board of health, and they fail to abate the nuisance within the time given them you can take action against them as the law provides. If, however, there is no practicable way in which they can abate their nuisances, local boards of health usually hesitate in demanding that citizens shall do that which it is impossible for them to do.

DISINFECTION.

Who Shall Disinfect?

Answer.—As regards disinfection, the practice is somewhat different in different towns. In a few of the towns, all of the work of disinfection, done by local boards of health, is done free to the householders of the infected premises, and at the expense of the town. In other towns, those persons who are able to pay the cost of the disinfection are required to do so, and the town bears the expense of the disinfection for those families who are unable to pay. I would refer you to sections 8 and 9, on page 3 of "Abstract of the Health Laws." You will

there see that the local board of health may at its option notify either the owner of the premises, his agent, or the occupier of a house to cleanse and disinfect, and this must be to the satisfaction of the health officer or board of health. You will further notice that section 9 provides the course which you may take in case a person refuses to do the disinfection, or to have it done as may be required by the local board. Hoping that I have satisfactorily answered your inquiries, I remain, etc.

Spraying in Formaldehyde Disinfection.

Many of the sprinklers for using formaldehyde are nothing more than playthings. They are of no practical worth in disinfecting on a large scale, as in the disinfection of rooms. I know nothing about the Red Cross Disinfector except what is told in a circular which I have recently received from Johnson & Johnson, the manufacturers. The evidence presented by the few testimonies which they send, should be taken with much caution. In referring to a practical test they fail to mention the name of that competent bacteriological authority. I should be afraid that their Lister Fumigator, as they call it, is good for nothing, and I think that that is the only safe stand to take until more satisfactory testimony is produced to lead us to think otherwise.

Other methods of using formaldehyde in the solid form have been shown to be efficient on a small scale, but the cost of formaldehyde in this form has been too great to use it in sufficient quantity for the general work of disinfection such as is frequently presented to local boards of health.

Formaldehyde.

Since writing my hurried letter to you circumstances have rendered it impossible for me to re-examine your letter. I think that you had very full instructions in the circulars which I sent you, but I answer some points in your letter which may perhaps be helpful to you.

Formaldehyde is much more effective than sulphur disinfection, but this board has never claimed for it anything more than that it is an efficient disinfectant for surfaces. It will not penetrate deeply into fabrics in ordinary room disinfection. The clothing, bedding, rugs, and carpets should be removed, and disinfected otherwise—in accordance with the instructions in Circulars 45 and 68.

This board recommends the use of formaldehyde solution. It is now much cheaper than it was when Circular 68 was issued. Disinfection with formaldehyde solution is rather more trustworthy and otherwise preferable to that with wood alcohol.

The personal disinfection of patients may be done by washing the hair and the body with a solution of carbolic acid—our Solution 1, or with Solution 6, not full strength. For washing the whole body fifteen grains (one quarter dram) would be strong enough. The corrosive sublimate of Solution 6 should be handled only by careful persons.

Formaldehyde solution is not poisonous unless it is swallowed. It is very irritating at the time to the eyes and mouth, but there is no danger in breathing all that a person would be likely to breathe.

The final disinfection in connection with cases of scarlet fever should not take place until the period of desquamation or peeling is entirely through.

School-houses.

In reply to yours of yesterday, I would say that the best form of formaldehyde generator which is probably available to you is what Professor Robinson calls the "Bowdoin Vaporizer." The 40 per cent. formaldehyde solution is used in it. Formerly when formaldehyde solution (formalin) was so high it could not well be used as a general disinfectant, but now the price is down to 30 cents retail, and may well be used in the general disinfecting work which local boards of health may be called upon to do.

I do not, however, believe it is necessary for you to get a generator for the disinfection of the schoolroom. The best and surest way in disinfecting it would be to scrub the floors with a disinfecting solution, either Solution 6 or 7. Personally, I should prefer Solution 7, applied rapidly with a long handled mop so that the solution will soak well into the cracks and crevices of the floor. In addition to this I would, with a wet cloth dipped in the disinfecting solution and wrung out slightly, wipe or wash thoroughly the furniture that was occupied by the infectious pupil, or, if you deem it best, have all of the furniture in the room, particularly all horizontal surfaces wiped with a disinfecting solution. In short, for the room follow out the line

of disinfection which is indicated in the paragraph numbered 2 on page 9 of Circular 68.

I have made arrangements with Bowditch and Webster, of Augusta, and with the East Side Pharmacy, Bangor, to keep formaldehyde solution and sell it at 30 cents a pound, and I shall make arrangements as soon as possible with druggists at a few more central points in the State. I am very glad that you have taken the action which you have. Your advice to those few other pupils who had been specially exposed to the infection, to receive immunizing doses of antitoxin, was good. I hope, however, that the need of that need not occur.

Cistern.

A correspondent asks how he shall disinfect a cistern and suggests the use of charcoal for that purpose suspended in a bag in the water. He also asks whether breaking the surface of the water with a pole will tend to purify the water by aerating it.

Answer.—If I were to use anything for the disinfection of a cistern I should use milk-of-lime, preparing the lime just as you would for whitewashing, and flushing and scrubbing the interior of the cistern with a large quantity of it. Of course you would need quite a large quantity,—half a barrel or so, after you had previously emptied and cleaned out the cistern as well as possible.

The value of charcoal for the purpose mentioned by you is so slight that I should not deem it worth using.

From some cisterns when they are full there is always a transudation outward from them into the surrounding soil, but, on the other hand, when the water is very low in them, the transudation through the walls of the cistern is from the ground into the cistern. I would suggest whether you think there is any possibility of this having occurred in your cistern? You make no statement in regard to whether the cistern is well above the surface of the ground or below.

The breaking of the surface of the water with a pole would have so slight an effect in aerating it that it is not worth while doing it. It would, on the other hand, serve to stir up any material which has settled to the bottom. Sedimentation is quite an important factor in the purification of water. Of course, some of the materials are soluble, but bacteria and all other matter in the solid form obey the laws of gravitation.

Cistern water, upon the whole, if we can be fully assured that there is no transudation through the walls of the cistern from polluted ground, is probably less likely to communicate typhoid fever or other water-borne diseases than is well water. But it is not advisable to use either cistern water or well water when they have a bad odor or bad taste.

School-books.

In the case of the infected school-books and other school material, I would advise you to burn only those few books which are known to have been used by infectious pupils. The rest you can disinfect in the following way:

Fit up shelves in a perfectly air-tight closet or large dry-goods box made air-tight by pasting up the corners and all cracks with brown paper. Then stand the books up on end so that the covers and leaves are spread open as much as possible. Then upon an old sheet or some other absorbent material in the bottom of the box, pour solution of formaldehyde (the strong 40% solution, full strength), a quantity equaling one fluid ounce to each cubic foot of space. There are sixteen fluid ounces in a pint.

Then immediately close the closet or box, paste it up tightly and leave the books exposed to the fumes of the formaldehyde four or five hours at least. You could, however, do the work more rapidly and more efficiently if you owned a formaldehyde generator. If you had one, you could run the tube extending from the generator through the keyhole or knob-hole of the closet door or through a hole bored through the side of the box, and send a sufficient quantity of the formaldehyde in for the disinfection of the books.

A good formaldehyde generator is that devised by Professor Novy, manufactured by Parke, Davis & Company of Detroit, Michigan. Your town should own one and have it in charge of your local board of health. Formaldehyde may be obtained of any of the druggists whose names are given upon the slip which I herewith enclose.

To feel sure that the work of disinfection has been thorough, the books should be put in a small enclosed space so that you can give them an extra large dose of the formaldehyde.

A Schoolroom.

For the disinfection of the schoolroom, scrub up very thoroughly all surfaces with solution 6 or solution 7. Simply brush-

ing the dust from the ceiling and the upper part of the walls with a damp broom, or a dampened cloth tied over a broom will suffice. But the lower part of the walls and all other surfaces should be washed with a disinfecting solution. If you can get the formaldehyde solution—solution 7 will be safer for non-professional persons to handle than solution 6, although there would be no danger in using the latter save from accidentally swallowing it.

After you have done all this, the disinfection of the room with formaldehyde gas might be used, but if the scrubbing up of all surfaces has been thorough, particularly of floors and desks, the disinfection with formaldehyde gas may be omitted.

In doing the preliminary sweeping or disinfection, it should be done in the damp way by scattering a plentiful quantity of dampened sawdust over the floor, and then sweeping.

A Fur Coat.

Dr. Smith of Portland, just telephoned to me in regard to the fur coat which is infected. We think there will be no difficulty whatever in thoroughly disinfecting it by putting it into a tight box, sprinkling it thoroughly with formaldehyde solution—the 40 per cent. solution, full strength—and then closing it up tightly for at least twenty-four hours.

Figure out how many cubic feet there are in the box which you are to use, and then use about two ounces for each cubic foot. Be all ready to close the box quickly, then pour the formaldehyde in and shut the box up. It would be well to paste all the corners of the box and all cracks with strips of paper so as to make it as nearly air-tight as possible.

Rooms.

After sorting out the clothing, bedding, and other things that were in the sickroom, as is advised in Circular 45, and scrubbing up the floor and other surfaces with a disinfecting solution, solution 6 or 7, you can complete the process of disinfection by spraying formaldehyde upon sheets—the so-called Chicago method. From a line strung across the room to be disinfected, suspend common bed sheets, fastened by clothespins or otherwise to the lines. Have two sheets for about every 1,000 cubic feet of air-space in the room. After everything is ready and the room has been closed up tight, all but the door through which the disin-

factor is to escape, spray the formaldehyde solution full strength upon the sheets, using at the rate of a full half pint for each 1,000 cubic feet of space. Before you do this, it is well to tie a wet towel over your mouth and nose, pour sufficient formaldehyde solution into a large bowl, draw it into the sprayer, take a long breath and then spray the sheets rapidly, covering them as evenly with the formaldehyde solution as possible. The evolution of the formaldehyde solution is so rapid that this part of the work will have to be done very quickly. Close up the room, and leave it closed, exposed to the action of formaldehyde for five or six hours at least.

The brass syringe or sprayer which I said I would lend you will hold probably about ten ounces. If you will send word to me just when you want it, I will send it over by the stage driver.

(It may be added here that the State Board of Health thinks that some other methods of disinfection are preferable to this, as being more efficient and more economical of formaldehyde. At present it would seem that those forms of apparatus which generate formaldehyde gas by the volatilization of the 40% solution, either those which are to be placed in the room during the process of disinfection or those which are to be operated outside of the room while the formaldehyde is carried through the keyhole or other opening through the door, are preferable forms of apparatus.)

Letters.

You can easily disinfect letters received in your institution by arranging a small tight tin or other box large enough to receive the letters and large enough to receive in addition an old handkerchief or other absorbent material in the end of the box also. Drop the letters to be disinfected into the box, preferably unsealed or punched so that the formaldehyde gas may reach the inside, and then pour a tablespoonful of formaldehyde solution (the 40% solution), in upon the absorbent material and close the box quickly and tightly, letting the letters remain exposed to the formaldehyde four or five hours at least. It would be better to have the cubic capacity of the box not more than $\frac{1}{4}$ cubic foot.

A still better arrangement for the disinfecting box would be to have a perforated metallic false bottom raised $\frac{1}{2}$ an inch or so above the real bottom of the box, the lower space for the

absorbent material and formaldehyde solution and the upper for the letters.

Houses.

The quantity of 40% solution of formaldehyde which you mention—one quart to 1,000 cubic feet—is very ample. I think we may say that one pint for each 1,000 cubic feet of space is ample for ordinary room disinfection, properly used.

I am afraid that the method of using it which you propose, in the hands of the ordinary health officer would not be trustworthy. It would, at least, be much more convenient to use an apparatus especially devised for the purpose. My personal preference would be an apparatus like that by Professor Novy of Ann Harbor and manufactured by Parke, Davis & Co. George C. Frye of Portland is the agent for it and sells it for \$9.00. The Novy Generator consists of a copper flask which holds about two quarts with a tube leading from it which may be run through a keyhole, or using a larger tube, it may be put through the hole occupied by the door-knob after the knob is removed. It has beneath it a Primus burner which evaporates the solution very rapidly.

Even with the best form of apparatus, formaldehyde should not be trusted to do the whole work of disinfection which you undoubtedly understand. The preliminary work, washing down surfaces, especially the floors, of disinfecting bedding, rugs, carpets, etc., should be carried out before the formaldehyde is used for room disinfection. With clothing hung up and well exposed in a small air-tight closet, or other small enclosed space and with extra large quantities of formaldehyde gas, we can undoubtedly efficiently disinfect fabrics, but we cannot be sure of disinfecting such articles in a large room.

Solidified formaldehyde is exploited just now. It may be all right, but as yet there is no trustworthy and sufficient evidence that it can be used efficiently and economically.

Schoolhouse.

The best way to disinfect the schoolhouse will be to scrub down the surfaces very thoroughly with solution 6 or solution 7, and when you come to the floors use a large enough quantity of the solution to wet the cracks and to disinfect any infectious dust which may be in them. The ceiling may simply be brushed down with a broom, as the first stage of the disinfecting process,

to remove any dust or dry cobwebs which may be adhering to them. So far as the walls of the room are concerned, the upper parts do not require so thorough washing as the lower parts which the scholars come in contact with.

Disinfect books by arranging shelves in a tight box, making it doubly tight by pasting it up thoroughly with paper. Place the books upon the shelves, standing up on edge with the leaves arranged as loosely as possible, not piled up flatwise. After the books are thus arranged put an old towel or other absorbent material in the bottom of the box, pour upon it at least one ounce of formaldehyde solution to each cubic foot space, and close the box up tightly, letting the books remain thus exposed to the formaldehyde for at least five or six hours—better over night.

Typhoid fever.

The rules for disinfection and the work of carrying out the disinfection are practically the same for all infectious diseases, save typhoid fever. In the typhoid fever circular you will notice that the greatest emphasis is put upon the disinfection of the discharges from the typhoid fever patient, and of all things which may possibly have been soiled by him. The list of the contagious diseases which the law requires to be reported to local boards of health and to the State Board, is given on the back of form I.

TUBERCULOSIS AND SANATORIUM TREATMENT.

Where is Sanatorium Treatment Available?

Question.—A member of my family has, I fear, consumption. Kindly let me know whether there is a sanatorium for consumptives in this State, if so where, and if none, where there is one? I know of the State Sanatorium at Rutland, Mass., but they accept only Massachusetts patients.

Answer.—In the same mail with this I send you a copy of the *Sanitary Inspector*, on the last page of which you will find my reply to a physician who a little while ago made an inquiry identical with yours in the interest of one of his patients. As you appear to be aware, the sanatorium at Rutland, Massachusetts, was established by the State and, of course, admits only citizens of the State of Massachusetts. In the sanatoriums which are supported by private philanthropy the number of beds

available is entirely inadequate for the number of persons who apply for admission. I doubt whether more than one in ten who seek admission are received. If the member of your family of whom you write is in the incipient stage of the disease, there is a possibility of obtaining admission to one of the few of these sanatoriums, and if you will let me know the name of the attending physician so that I can get a statement in regard to the condition of the patient, and if you want me to do so, I will apply to the proper persons for admission, and use my influence so far as it goes in gaining admission for the person of whom you write.

Dr. Bowditch of Boston, has charge of a small sanatorium in Sharon, Massachusetts. This is for women and girls exclusively. The only other free, or partially free sanatoriums to which persons from this State would have a possibility of gaining admission would be the Adirondack Cottage Sanitarium, or the Loomis Sanitarium. In the Adirondack institution the patients pay five dollars per week. In the Loomis Sanitarium, Liberty, New York, the rates are fifteen, twenty, and twenty-five dollars per week. These rates have placed the institution upon a self supporting basis, and the directors were to build another institution upon their grounds to be about half a mile distant from the other for persons who are not so well-to-do. The rates, I was told when I was there last year, were to be seven or eight dollars a week in the new sanatorium.

Aside from these which I have mentioned, there are a few private sanatoriums under good and trustworthy management, but the prices are pretty high. The one in charge of Dr. Von Ruck, Asheville, South Carolina, is a good one, I think. There are some also in Colorado, but as a general thing, persons from this State cured in Colorado are permanently expatriated. The cure which is the most likely to be permanent for persons who wish to reside in the State of Maine is the cure which is made in a climate similar to our own.

I would by all means advise you not to delay the open air and generous diet cure until the possibility of a sanatorium is determined. It should be begun at home at once. It is true that in our climate there are many inconveniences to contend with, but having overcome them, there is a real therapeutic efficacy in the coldness of the winter temperature in the State of Maine. Patients properly protected against the cold—Eskimo attire you

might call it—gain much more rapidly in the winter than they do in the summer when taking the fresh-air cure whether it is in Maine, New York, or elsewhere in the temperate zone. A little while ago there was an interesting statement from Mrs. Vickery, Auburn, Maine, in the *Lewiston Journal* in regard to her condition last autumn and her cure with the fresh-air cure last winter in her home. If you have not seen it, I will look it up for you. It shows what may be done right at home by perseverance. The value of our Maine climate, particularly that of the interior part of it, is becoming more and more recognized by some of the physicians outside. Yesterday, one of the patients apparently cured at Rutland called to see me. Upon leaving the sanatorium the physicians advised him to come down to Maine and live, and he has followed their advice.

To a Physician.

Your suggestion of an inspection of the schools for the purpose of detecting incipient cases of pulmonary tuberculosis is a good one, for it is very important, not only for such pupils themselves that they are kept from the schools, but their exclusion is a matter of prime necessity as regards the safety of other pupils. There cannot be too much discussion of this subject. It should be brought home to the people at large as much as possible so that the danger of tuberculous sputum, whether in their homes or in their schools, will be a matter of common knowledge which will influence them in their daily life.

I wish that in every city, village, and town of any size, arrangements could in some way be made so that a medical inspection of the pupils could be made at not too long intervals,—as often at least as at the beginning of each new term.

To a Physician.

I can fully sympathize with you in the fact that it takes some men a long while to get out of old ruts, no matter how positively it is proved that some of their opinions are erroneous. This Board feels grateful to you for your efforts to educate the people in the right direction in relation to pulmonary tuberculosis. It may seem to us that the work is going on much too slowly—as it is—but we are accomplishing considerable, and in the next five years I think we shall have much more in results to show. The head clerk of the Department of Vital Statistics has just come to me saying that consumption takes for the first time, in the

tabulations which she is now preparing, the third place among the causes of death in this State. The number of deaths from pulmonary tuberculosis from 1892 to 1898 inclusive have been respectively 1,352, 1,299, 1,262, 1,195, 1,172, 1,128, 1,021. The mortality from this disease has, therefore, been reduced one-quarter. That, I think, is a very good showing.

From a Citizen of Maine.

With my wish that you add my name to the list of members of the proposed association for the benefit of consumptives, I must tell you how interested I was in reading your work on tuberculosis. You have boiled down a large amount of matter into some good plain common sense and set it forth so that everyone can understand it, and your book should be distributed freely all over the State.

To an Inquirer Outside the State.

In 1889, the State board of health of Maine issued a circular on the prevention of consumption, it being the first circular on that subject issued by a state board of health in this country. Circular 54, a copy of the revised edition, is included in the packet which I send. This circular has been distributed plentifully in almost every part of the State, and it is believed that it has had a large influence in leading the people to adopt more intelligent measures to prevent the communication of tuberculous infection from the sick to other persons. Working in the same educative line, the State board has continually, through the *Sanitary Inspector* and its annual reports, sought to distribute information which might enable the people to effect a reduction in the tuberculosis mortality rate in the State. That our efforts have achieved a moderate degree of success is shown in the statement on page 53 of the pamphlet which I send, "Tuberculosis—Infection, Heredity, Prevention, Hygienic Treatment."

Though local boards of health have authority to take action in connection with cases of tuberculosis when it is deemed necessary to do so, this educational work, it is believed, has effected the larger part of the lessening of the death-rate from tuberculosis. By referring to page 7 of "Abstract of the Health Laws," it will be noted that pulmonary tuberculosis is one of the notifiable diseases. The law makes it the duty of both the householder and of the attending physician to report cases of pul-

monary tuberculosis to the local board of health. It is not the intention of this law that cases of tuberculosis shall be isolated or quarantined, but merely that local boards of health may have information of the existence and the whereabouts of cases of tuberculosis, so that the family, by means of Circular No. 54 or otherwise, may receive suitable instruction which may enable them to guard against the dangers of the communication of infection.

Local boards of health have authority to disinfect houses in which there have been cases of pulmonary tuberculosis. (See sections 8 and 9 on page 3 of "Abstract of the Health Laws.") Hitherto, however, the advice of the State board of health to local boards has been as follows: When the family in which a case of consumption exists, or in which a consumptive patient has died, owns the house in which they live, they shall be advised, and if need be, strongly urged, to have the disinfection of the rooms, of the bedding, and clothing, and all other things which have been used by the consumptive patient, done in an efficient manner. When, however, the family is living in a rented house, and leaves this house for another tenement, local boards of health are advised to insist upon the disinfection of the vacated house before another tenant is permitted to enter it.

To a Local Board.

I think that your duty in connection with the two cases of consumption consists only in assuring yourself that the family are instructed in regard to the proper methods of preventing the communication of infection from the sick to the well. If they have not had intelligent instruction in that direction, it is very important for them to have it either through Circular 54, or otherwise. Every bit of everything they spit up should be burned, but before it is burned some arrangements should be had so that flies may not get into the sputum and track it around. There is danger of their carrying it to the food used in the house.

Enquiry about Sanatoriums.

Answer.—There is the probability that one or more sanatoria for consumptives will be established in the future, but how near in the future it is impossible to say. The only movement for establishing an institution of the kind is that which has been made and is now being made by the Maine State Sanatorium

Association. The circular which I herewith enclose indicates the methods in which the association is working.

No legislative attempts have been made to establish a sanatorium.

Although personally I have deemed it inexpedient to ask our legislature to make an appropriation for the establishment of a sanatorium until we have made an earnest attempt in the other way to do it, I most thoroughly believe that the aiding of its incipient consumptives to effect their recovery is a very legitimate form of State charity, and one which pays well for money expended in that direction.

SMALLPOX AND VACCINATION.

To the Agent of a Paper Mill.

During the first four or five years after the establishment of the State board of health, several outbreaks of smallpox occurred in paper mills in this State. Since the enactment of the law of 1893, requiring the vaccination of all operatives in and around paper mills using rags, a copy of which I herewith enclose, not a case of that disease has been traceable to the paper mills. The value of the law to the corporations themselves and to their respective towns, and the whole State, is thereby well shown. The importance of the faithful observance of the provisions of the law is also apparent.

If, unfortunately, an outbreak referable to a paper mill should occur, it would be the duty of the State board of health to make an inquiry into the cause of it. In such a case, it is to be hoped that the outbreak could justly be referable to causes other than negligence of the requirements of this law.

Question.

Where a case is quarantined by a board of health, has any single member of the board a legal right to remove such quarantine without the knowledge and contrary to the wishes of the other two?

Answer.—A single member of the local board of health has strictly no legal right to raise a quarantine without the knowledge and consent of the other members of the board.

Question.

When a town persistently ignores the law regarding the furnishing of vaccination to those desiring it though the attention

of the officials is called to the law time and again, what can be done?

Answer.—The matter of providing free vaccination rests entirely with the local board of health. The local board has full authority to make such arrangements as it deems to be for the best interest of the town. In a matter of this kind it would, of course, be better for the local board to work under the approval and coöperation of the municipal officers, but such approval and coöperation failing, the local board of health is not absolved from its duty

To a Local Board.

The State board of health would not encourage the unnecessary expenditure by local boards of health of a single cent of the town's money, but in this matter it should be borne in mind that a possible introduction of smallpox infection might cost the town much more than the cost of vaccinating your town. I would suggest that to make the burden lighter, it might be well for you to vaccinate a part of the town this year and the remaining part next year, choosing the most convenient time for the work. June would be a good month. After your town has once been gone over, the annual cost of vaccinating the new comers by birth and otherwise would be comparatively slight. The town could thus be kept well protected against smallpox.

The price paid by local boards of health for vaccinating in many of the towns has been 25 or 30 cents. Twenty-five cents is as low as I have heard of any physician doing the work.

You would need to employ a trustworthy physician, have good vaccine virus used, and have the work done carefully.

The obligation to provide and offer free vaccination is upon the local board of health instead of the town. The town, however, must pay reasonable bills thus incurred in complying with the provisions of the law.

Arranging for Vaccination.

At the request of Mr. ———, secretary of your local board of health, I write to you about vaccination. The law makes it the duty of your local board of health to provide free vaccination—to offer it at least—to the people of your town every year. See chapter 172, laws of 1893.

Of course, the local health officers in arranging for vaccination should have it done as economically as possible—so that the

burden would be felt as lightly as possible. The most convenient way would, of course, be an arrangement for a house to house vaccination, but covering the whole town in this way might cause considerable complaint among the taxpayers. If you do not think it would be expedient to do this for the whole town, I have sometimes recommended arranging for vaccination in one part of a town one year, and in another part the next, and so on, so that in a short time the people would be fairly well protected by vaccination. As regards the payment of the bills all reasonable expenses incurred in carrying out this work must be paid by your town.

Disinfection.

An inquiry was received in regard to the disinfection of a house which had been taken by the authorities as a hospital for smallpox patients. The paper and the plastering were off in some places. There were two finished rooms on the second floor with an unfinished and open chamber between them. The smallpox patients occupied all of the finished and the unfinished rooms. There were also two sheds, one adjoining the house, in which various things are stored. These sheds were also used by the patients during their convalescence. The owner asked advice as to the disinfection of this house.

Answer.—Answering your letter just received I would say that I think that your house can be thoroughly disinfected so that it will be entirely safe. The work should, of course, be done very carefully and under intelligent supervision, and done properly it would cost more for labor than for material.

The finished rooms occupied by the patients should be disinfected by washing them down thoroughly—all their surfaces, floors, walls, and a light brushing of the ceilings with disinfecting solution No. 6 or No. 7. Floors particularly should be thoroughly soaked with the solution so that it will run into the cracks and thoroughly wet the dust and dirt there. After that is done they should be disinfected with formaldehyde, giving them a good large dose of the gas by means of the formaldehyde generator which Dr. ——— has.

For the unfinished part of the chamber I should advise washing the floors thoroughly with the disinfecting solution—solution 6 or solution 7—and then spraying them thoroughly with the disinfecting solution. Immediately after the washing or the

spraying is done all cobwebs and dirt should be brushed down with a broom which has been dipped into a pailful of the disinfecting solution.

The shed may be disinfected by spraying it thoroughly with the disinfecting solution, solution 6 being preferable because it is cheaper.

If there is a privy connected with the establishment, the contents of the vault should be removed, the seat should be scrubbed with the disinfecting solution, and then the whole thing should be deluged with a plentiful spraying. If it is probable that any of the articles were used by the patients or that they offered convenient seats for them while in the shed they should be scrubbed with the disinfecting solution. A good tight barrel should be used for making up the solution to be used, and it should be made up only just before it is to be used.

The fact that the corrosive sublimate of solution 6 injures metals should be taken into consideration in disinfecting articles and in the choice of a syringe or spray pump to be used. For work of that kind I have used a large brass garden syringe with a rose which throws rather a fine spray, and with which a pailful of the solution can be applied quite speedily. You probably can find some kind of a foot pump which throws the right kind of a spray. If a metal pump or syringe is used it should be rinsed out with water immediately after applying spray with it.

I think that the directions which I have given in this letter are all that you need with the addition of what can be learned from Circular No. 68, a copy of which I herewith enclose.

If solution 6 is used, the persons using it should bear in mind its poisonous nature so that there may be no danger to man or animals from drinking the solution or inhaling the spray. There will be no danger breathing in the comparatively coarse spray that would be used unless the person stood in the pathway of the spray when it is thrown.

A Smallpox House.

Smallpox occurred in a house twenty-five years ago. The owner wishes to tear out some portions of the inside work and renovate. He asks whether it will be safe to do so.

Answer.—I should deem it probable that it would be entirely safe for any person to tear out the inside of the old house, but as the infection of smallpox has sometimes been known to be

preserved for a long while in some cases. I would suggest that it might be safer to employ some person who has somewhat recently and successfully been vaccinated, or has had smallpox. A recent and really successful vaccination would be just as efficient as a previous attack of smallpox, especially if the attack of smallpox occurred some time ago.

DIPHTHERIA.

To a Local Board.

Diphtheria antitoxin is worth a great deal in helping to bring an outbreak of that disease to a speedy close. It is, of course, worth everything when administered early for its curative effect. If you find the disease in a family which is unable to pay for the antitoxin your local board of health has ample authority to arrange with any physician to administer it at the expense of the town. Of course, the family should pay if they can, but if they cannot, lives should not be permitted to be lost for the want of it.

To a Local Board.

Some of the advice which you have received has been misleading. It may be that the use of antitoxin shortens somewhat the period during which the germs of diphtheria remain in the throat, nevertheless, I should say that it is not safe to depart, in the cases in which antitoxin has been used, from the rule that it is not safe to make the final disinfection and to release the children from quarantine until three or four weeks have passed after recovery. If it is a question of re-admitting children to the schools, the period should be four weeks at least. See "Diphtheria" in Circular No. 53.

In a letter I cannot give you so explicit directions for disinfection as are given in the circular on diphtheria and in Circular No. 68, but I will say that a great deal of the work of disinfection which is done by local boards of health is altogether too inefficient, and the same may be said of that which is done by many physicians. I would advise you to convince yourself that the disinfection is done just as thoroughly as is advised on pages 2 and 3 of the diphtheria circular. A fumigation with formaldehyde gas or with sulphur is far from being enough. The only trustworthy way of disinfecting a house and its contents where there have been cases of diphtheria is to disinfect everything by boiling or by steaming which can be submitted to those processes,

then wash thoroughly all of the floors and other surfaces in solution 6, or solution 7.

For instance, in using solution 6 or solution 7, after the carpet has been removed from the room to be disinfected, and the other things have previously been disinfected as is advised for them in the circular, a half pailful of the disinfecting solution should be applied to the floor plentifully, enough so as to wet the cracks between the boards. If solution 6 is used, a hand mop may be used, but if solution 7, it is better to use a long handled mop. If a room to be disinfected is on a second floor as much of the solution should be applied to the floor as can be without wetting the ceiling below. The corrosive sublimate, of which solution 6 is made, is cheap stuff. The only trouble with it is that it should not be put into the hands of ordinary families, but some intelligent person should be employed by your board to take care of it and to use it. It would be better if you could employ some person at the expense of the town to do the work of disinfection, particularly if the householders are not able to pay for the work.

After everything possible has been boiled or disinfected by steam, and the surfaces of the room, of furniture, and of other articles have been washed in a disinfecting solution, formaldehyde disinfection should be used if available to you, and I would advise you to send to George C. Frye, Portland, Me., and get a formaldehyde generator, the one devised by Professor Novy, and manufactured by Parke, Davis & Co. It costs \$9.00. The formaldehyde solution to use with it will cost you thirty-five cents a pound obtained from Henry J. Hathaway, druggist, Houlton, Me. It would be well for you to order formaldehyde in large enough quantities so that you may have it on hand all the time—fifteen or twenty pounds at a time. A pound is almost a pint.

If an infected room has rugs or carpets, these must be taken up before they and the floor can be disinfected. The rugs can be disinfected by boiling them or by steaming them, or spreading them out upon the ground, it would be possible to disinfect them by washing them down with a broom dipped in a pailful of disinfecting solution. A large quantity would have to be used, enough to soak them through thoroughly. If solution 6 is to be used it would be better to soak them in water afterwards to remove any excess of corrosive sublimate which might remain in the fabrics.

To help you in making solution 6, I would say that you could buy the finely powdered corrosive sublimate in ounce packages of the druggist. There are eight drams in one ounce. You could, therefore, dissolve one ounce in eight gallons of water, preferably dissolving the corrosive sublimate in a gallon or two of hot water, and adding enough cold water to make the quantity up to eight gallons. You could not easily dissolve the corrosive sublimate unless it is quite finely powdered, and even then it would be well to use the hot water as I have advised to enable you to dissolve it more quickly.

Never leave solution 6 where by any possibility animals, or children or any other living thing can drink it.

To help you in making solution 7, I would say that there are eight ounces in half a pint. You would therefore want to use three-quarters of half a pint of the strong solution of formaldehyde as you buy it, making one gallon of solution 7.

In every epidemic of diphtheria there are always some cases, and often many cases, in which the disease is mild and in which the cases are questionable, or are called tonsilitis, or simply sore throat. The better plan is to regard all such cases at such times as diphtheritic and treat them accordingly. If we had the State bacteriological laboratory we could determine which are and which are not diphtheritic. As it is now, it is absolutely impossible for any physician to make a positive diagnosis in many of these cases. If any other points come up in which I can help you, kindly let me know.

I would advise you to make a very thorough distribution of Circulars 44, 47, and 50, putting a copy into the hands of each family in your town. You can probably arrange through your postoffice, clergymen, teachers, etc., to have this done. Let me know how many copies you think you will need, and I will send them to you at once.

Question.

How near is it safe to go to a house infected with diphtheria where the doors and windows are opened and screened, and how near to a person, an inmate of said house, standing in the outside door or at a window?

Answer.—The danger of taking diphtheria through the air when it is free outdoor air is very slight indeed. There would, of course, be danger for young persons, particularly, to enter a

house in which there are cases of diphtheria, but there is no danger in passing a house or in going quite near to it, or talking with the infectious persons of the house, if the person talking with them is a rod away or so. Of course, it would not be advisable to have children playing or running about the immediate vicinity of the house.

Question.

Is it safe for a storekeeper to take kerosene cans from a house in which there are cases of diphtheria into his store, fill and set out, and handle other articles without washing his hands?

Answer.—There is hardly a possibility of danger in the storekeeper taking the kerosene can, filling it, and returning it to the immediate vicinity of the house, provided he does not enter. If I were doing it, I should wash my hands, but the storekeeper probably would endanger other persons but very little if he chose not to do so.

Membranous Croup and Disinfection.

The secretary of a local board of health reported the death of a four year old child of diphtheria though the diagnosis of membranous croup was made by another physician.

Answer.—I am very glad that you have promptly quarantined the infected family and hope that you will take all necessary precautions to prevent the spread of infection. Membranous croup is simply one form of diphtheria and requires exactly the same management as any other kind of diphtheria.

I would advise you to have the house thoroughly disinfected immediately if no new cases have occurred. So long as the house remains infected, the other persons in the house are exposed to infection. If after disinfecting, other cases should come down with diphtheria, it would necessitate, of course, a second disinfection. Do the work of disinfection in accordance with the directions which are given in the diphtheria circular, boiling everything which can be so treated and scrubbing floors and other surfaces with a disinfecting solution, form 6 or 7. Then after sorting out the things and disinfecting them as is advised in the circular, formaldehyde disinfection should be used if you can arrange for it.

Period of Quarantine.

I may make the general statement that children who have had diphtheria should be kept isolated for three or four weeks at

least, after recovery, that is, not allowed to associate with other children or young people who are more susceptible to the infection of that disease than older people.

Persons who have been exposed to the infection of diphtheria should be kept under quarantine or isolated for about a week after they have been removed from the source of infection. That is, after they and their clothing and things have been disinfected and they have left the infected house in which a person is convalescing from diphtheria.

Quarantine and Furnishing Help.

After a person has had diphtheria, the infection often remains in the mouth and throat for quite a little while after he has fully recovered. For that reason it is better not to do the final disinfection of the house and release from quarantine all of the persons in it too soon. So far as concerns the quarantine of children before their return to school, three or four weeks is not too long a time.

In the case of adults whose work would not bring them into other houses and who may be trusted pretty well to keep away from other people, and especially from children, they may be released from quarantine earlier. The young man of whom you speak might be disinfected soon if he is apparently all well, and if he will not go for some time into the company of children, or into other persons' houses. That is, you can disinfect him and his house, and partly release him from quarantine,—that is, release him on conditions.

If, however, there are other cases of diphtheria in the same house he should not be released for some time except to go out around and about his own premises.

You are not obliged to furnish help to any man or any family unless they really need it. If they are well-to-do and can pay their own bills give them no help, except when a family is quarantined, whether they are well-to-do or poor, a man or a messenger should be furnished to do errands for them.

If a man is poor and not able to furnish himself with necessities in the way of medicine, food, etc., it becomes the duty of the board to supply them at the expense of the town. In doing that, however, a man should not be considered a pauper unless he was already a pauper when the infectious disease entered his family.

SCARLET FEVER.

Questions.

How long must a family be quarantined with a case of scarlet fever? How long after one is taken with scarlet fever or canker rash, before all danger of contagion is over? Can an ointment or anything be used to prevent infection?

Answer.—Scarlet fever, scarlet rash, and canker rash, etc., are only several names for one and the same disease, the disease manifesting itself differently in different cases. It is infectious from the first coming out of the rash until desquamation or the process of peeling is entirely done. The length of that period varies very much in different cases, from three weeks or so to as much as six weeks or perhaps longer in rare cases. The use of disinfecting washes or disinfecting ointments, perhaps, may help some in guarding against the danger of the spread of the infection, but until the skin is entirely smoothed off again there is no safety in permitting persons to go at liberty who are convalescing from scarlet fever.

Rubbing the surface of the body with any kind of oil or grease serves to keep the infection from flying, and washing the body with solution 1, solution 2, or solution 7 serves to destroy infection lingering in the skin. When, however, carbolic acid is mixed with oil or fats as in ointments, the disinfecting power of the carbolic acid is destroyed. Refer to the last page of the Scarlet Fever Circular, copies of which I enclose.

Treatment of Exposed Persons.

Question.—Some eight or ten of our young people have been exposed to scarlet fever in such a way as to make it probable that they may take it. None of them have had the disease. Is it the duty of the board of health to quarantine them at once, or the families in which they live?

Answer.—In the case of those young men and women who were exposed to scarlet fever, I would say that I should deem it inexpedient and unnecessary to quarantine them all. It would, however, be well for you to keep them under observation so as to know every day whether they become sick or not. If they take scarlet fever, it will, of course, be necessary to isolate them.

As they were exposed to scarlet fever, there is danger of their carrying scarlet fever in their clothing. I would, therefore,

arrange with them to disinfect the clothing which they then had on, and to wash their faces and hair especially, in a solution of corrosive sublimate. The best way to disinfect their clothing will be with formaldehyde in a small tight closet, or trunk, or box. Formaldehyde solution could be obtained of Bowditch & Webster, of this city, at thirty cents a pound, if you cannot get it nearer home. Use it full strength for the disinfection of the clothing. See page 5, Circular No. 68.

For the disinfection of the hair and face you can use our solution 6. You can find corrosive sublimate tablets, $7\frac{1}{2}$ grains each at any druggists. One tablet dissolved in one pint of hot water in an earthen washbowl will make the solution of proper strength. After it is used, do not pour it down the sink spout if the house has plumbing. This solution destroys metals.

An Epidemic Long Drawn Out.

Question.—For five or six months we have had more or less cases of scarlet fever in this town. With two or three exceptions cases have been mild. The result is, that at present there are probably over a dozen families with scarlet fever. It is almost impossible to enforce quarantine.

Answer.—I would urge your board to make some arrangements for the isolation of all the scarlet fever patients. The best way would be for you, or some member of your board to personally see the families in which there are cases of scarlet fever, to give them to understand that they must observe the directions which you give them to prevent the spreading of the infection to other families. A rather free distribution of Circular No. 50, I think would awaken some of the families to an appreciation of their duties to the public. It certainly has had a salutary influence in some communities. If this kind of moral suasion is found to be ineffectual in some of the families, you can apply a more rigid quarantine. Look over Circular 48 for advice.

In the disinfection of the houses, by means of Circular 45 you can instruct the families to do a large part of the work of disinfection, emphasizing the necessity of boiling or of steam disinfection for all things which can be subjected to these processes. The steam disinfection can be carried out by making use of an ordinary tin washboiler, as is advised on page 7 of Circular 68.

After the clothing and other things have been sorted out and disinfected by boiling or steaming, the floors, other horizontal

surfaces, and the wood work perhaps in the lower part of the room, should be washed in a disinfecting solution—solution 6, or 7. Next, if available, the fumigation of the rooms with formaldehyde is advisable, though if the work of boiling, steaming, and scrubbing has been thorough enough this may be omitted.

Scarlet Fever in a School.

A young girl who was in the graduating class of a high school, near the end of the last term had been quarantined on account of the illness of her brother with scarlet fever. This was a keen disappointment to the girl, and she cried so much that her parents feared the results. The girl herself had had a light sore throat and a slight eruption six or eight weeks before.

Answer.—That girl of whom you write had the light eruption so long ago that if desquamation followed it is undoubtedly now all over. If the conditions in the home are such that the girl could leave her clothing in one room and step into another room which had been disinfected, disinfect her hair thoroughly with a corrosive sublimate solution of 1:2000, take a hot soap and water bath thoroughly applied followed by washing the whole body in the disinfecting solution, say 1:4000, then put on clothing that has been thoroughly sterilized, then go to another boarding place taking nothing with her, not even a brush or comb or books, which have not been thoroughly sterilized, and finish out her school term it would probably be safe for her to do so providing that you could be sure that all of these conditions have been carried out very thoroughly and efficiently.

I should, however, be afraid that there might be some weak link in the chain of precautionary measures, and that the result might be that still a larger number of the girls might be crying because they cannot attend the graduation. If she were going almost anywhere else rather than into a school it would be entirely allowable for her to go after taking the precautions which I have mentioned.

I think that the school authorities out of consideration of the circumstances of the case should let her graduate by receiving her diploma or certificate just as the other pupils do. It would be very curious if they could not tell whether she is entitled to graduation without the help which they would get from that small part of her record which she might make in the short time

between now and the time of graduation. If this arrangement will be any consolation to the girl I think that would be the better way of compromising with her.

Authority of the Local Board.

I have lately received a letter from your village, which expresses a fear that scarlet fever will spread from the three houses in which there have probably been cases of that disease. The letter which I received makes it appear quite probable that scarlet fever was present in all those families. It appears also that there has been some question with your board as to your authority to do certain things under certain contingencies.

For instance, as to the authority of the local board of health to investigate the facts of contagion in a suspected house, though the case has not been actually determined in the courts, I think that the local board of health would have the right to make an investigation of this kind, or to quarantine a house in which it is evident that an infectious disease exists, although certain information may not be at hand as to the nature of the disease.

As to the disinfection of suspected houses, the local board of health has ample authority to order the cleansing and disinfection of them, and the disinfection must be done to the satisfaction of the health officer or the local board of health. The board may also make its personal supervision of the disinfection a condition of its being satisfied.

My correspondent may be at fault in some of his opinions and statements. Kindly let me know how the matter is.

Length of Quarantine.

The law prescribes no minimum and maximum period of quarantine for scarlet fever. Local boards of health have authority to quarantine the cases as long as they remain infectious. The period of infection lasts, at least, until the period of desquamation or peeling is complete, and that means until the last vestige of the roughness of the palms of the hands and the soles of the feet due to it, has disappeared. Even after that, persons who have had scarlet fever are infectious until efficient disinfection of the person, and the clothing and surroundings, has been carried out. See the paragraph relating to scarlet fever in Circular 53.

Disinfection of Scarlet Fever.

The house in which there have been cases of scarlet fever should be disinfected before the card is removed from the door.

As to who does the disinfection, the practice varies somewhat in the different towns and cities. If required to do it, it is the householders duty to carry out the disinfection, or to have it done in accordance with the instructions of the local board. For those not able to pay for the work, the city or town should pay to insure the safety of other persons in the municipality.

The law makes it the duty of the local board of health to require, and, if necessary, to provide the means of disinfection.

The cost of disinfection is borne by the householder or, when the local board of health deems it impossible or inexpedient to have the bill paid by the individual, the cost is borne by the town.

I send you a copy of Circular 45, and also one of 68 which will show you what disinfectants are recommended by the State board of health for these purposes. I am glad to answer your inquiries, but I am very sorry to learn that you have scarlet fever in your family.

Length of Quarantine.

Mrs. ——— writes to this office in regard to the quarantine imposed by your board. She says that there was no desquamation because the child had the disease in a very light form and there was not fever enough to cause peeling. Her letter indicates that your board has fixed upon six weeks as the unvarying period of quarantine in connection with cases of scarlet fever. I would say that in some cases the period of desquamation does not last so long as this, while in many cases it is not safe to do the final disinfection and let the child run at large until six weeks or even a longer period has passed. It is, of course, desirable to have the period of retention as short as is compatible with safety.

Please accept what I have suggested, and then let your local board use its judgment in this and similar cases. I find that there is need much more frequently of suggesting longer periods of quarantine for scarlet fever than of urging boards to shorten them. No child should be discharged from quarantine until the palms of the hands and the soles of the feet are entirely smoothed off, as an evidence of the completion of the period of desquama-

tion, and of course not then until a trustworthy disinfection has been done.

A Case of Disputed Diagnosis.

The secretary of the local board asks the advice of the State board.—The disagreement of the physicians in regard to the case of which you write, makes some little trouble for you, but you have to use your best judgment in regard to which diagnosis to accept. If I were a local health officer, as a general rule I should accept the diagnosis of the physicians who were first called to the case. One would be justified, however, in making an exception to this rule when the evidence against the first physician is preponderating, but, as I understand it, now, the testimony is two to one that it is scarlet fever. It might also be well for you to bear in mind that very often the first physicians who are called are in a better position to make a diagnosis than those who are called later, particularly if the later ones are called before it is time for desquamation to appear. In some mild cases of scarlet fever the eruption is quite fleeting, lasting for a short time only.

Disinfection.

There is no best disinfectant for all purposes. For instance, the best and cheapest way to disinfect clothing and bedding and all things else that can be submitted to those processes, is either by boiling or by steaming, as is explained on page 6, of Circular 68. For floors, wash them up with Solution 6 or 7, and one of the same solutions could be used for disinfecting furniture, wood work, and the walls of rooms by washing in one of them. The best disinfectant of rooms, after all of the preliminary disinfection has been done and they have been cleared out as much as possible, is formaldehyde gas. You would need, however, a formaldehyde generator or vaporizer and a supply of solution of formaldehyde if you were to use that method of disinfection. If this is not available, you could have the whole work of disinfection done with the boiling or steaming and with the use of the liquid disinfectant. Remember that solution 6, corrosive sublimate, is very poisonous if accidentally swallowed.

Disinfection and Release from Quarantine.

Mrs. ——— should not be allowed to return to ———, Mass., until the child has fully recovered, and has fully and completely passed through the stage of desquamation or peeling. She

should wait until all the fine branny scales have fallen and the skin has smoothed off. Then hers and the child's clothing, and everything else in the house that has been exposed to the infection, bedding, carpets, and everything, should be disinfected. There will then be no need of a certificate from your local board.

The disinfection should be done to the satisfaction of your local board of health so that you can know that it has been thoroughly done, having the cost borne by the householder, if the people are able to pay. The cost, however, will be but little other than the labor.

Do as large a part of the disinfecting as possible by boiling or by steaming in a common tin washboiler. See directions for steam disinfection in Circular 68, and in Scarlet Fever Circular. Hoping that the child may be rendered free from infection before starting for home so that there may be no danger of carrying the disease to other children upon the train, or elsewhere, I remain, etc.

TYPHOID FEVER.

To a Local Board of Health.

In the disinfection of that house and its surroundings where there has been typhoid fever I would advise you to make the people rake up and burn all trash that can be disposed of in that way. Then the best and cheapest way to disinfect the ground where they have been throwing out slops will be to use milk of lime very freely. You probably will want to use as much as a bushel of lime made up into whitewash, or milk of lime, as it is called in the circular on disinfection and in the circular on typhoid fever. Mix it up in a half hogshead or a large barrel, a little at a time, in accordance with the directions in Circular 68, and pour it out over the ground, pailful after pailful. Disinfect the privy vault in the same way by saturating it and the ground which surrounds it very thoroughly with the milk of lime. After it has stood some time and dried out, have the privy vault cleaned out, and then saturate the ground beneath it again.

You can disinfect the shed and the ground underneath it in the same way.

The room upstairs which had the case of typhoid fever where there is only a single floor should be disinfected by having the floor scrubbed thoroughly with solution 7, even if it does run

through somewhat upon the plastering beneath. You can make solution 7 by mixing a gill, or say two-thirds of a teacupful of formaldehyde solution with a gallon of water. You can obtain formaldehyde solution of Schlotterbeck and Foss, Portland, Maine, for thirty cents a pound. You will probably need two or three pounds for the house.

In addition to what I have written you will be helped by reading over carefully the directions for disinfection which are given in the typhoid fever circular.

To a Local Board.

From what you write, I think you have correct ideas in regard to your duty in connection with the case of typhoid fever. There is no danger of persons carrying the infection of typhoid fever in their clothing as there is with diphtheria, scarlet fever, and smallpox. The State board of health has never advised local boards to quarantine houses on account of the presence of that disease. The families in which cases of typhoid fever occur should have a typhoid fever circular as a help to instructing them in regard to the precautions which are necessary. There is, of course, great danger of the spread of the disease from the sick to other members of the family when cases are not properly taken care of, and neighbors or attendants might take the disease when the patient is not kept in a cleanly condition, and when the other directions which are given in the typhoid fever circular are not carried out. Instructions in regard to disinfection, etc., you will, I think, find very clearly stated in the circular on typhoid fever.

If local boards of health deem it best at any time to placard a house in which there is a case of typhoid fever, and the householder is willing, there is no objection to putting up the card. Some families have found it very convenient to have unnecessary callers warned away.

Children Attending School.

As a general practice, it is probably safe to let the children go to school from houses in which there are cases of typhoid fever, provided that the children are kept out of the sick-room, and further provided that they remain entirely well all the time. Children sometimes have typhoid fever in a mild form with hardly any other symptoms than a diarrhea. Such children *might not* stay home from school. If they were attending school they might infect the school vault, and thus possibly communi-

cate the disease to other children. This is, I presume practically the only danger.

Other Infected Articles.

Perhaps the germs of typhoid fever are not so likely to be in the air as those of some other diseases, but there is danger of other persons taking the disease from the rooms in which typhoid patients have been sick, or from the bedding or clothing which has been used by typhoid fever patients. The personal clothing and the bedding of typhoid fever patients are often soiled by the discharges which contain the germs. After drying, these articles when they are moved may give off the typhoid bacillus into the air, and thus it may find its way into the mouths of other persons. This is how it happens that washerwomen quite frequently take typhoid fever by washing the clothing of fever patients. They probably always take it while sorting out the clothing, before getting it immersed in the wash water.

Again, repeated attacks of typhoid fever have occurred in military barracks in which typhoid fever patients have been kept. These repeated attacks of fever have ceased after the thorough disinfection of the flooring with an abundant quantity of disinfecting solution so that it has penetrated and moistened and disinfected the infectious dust in the cracks of the floor. You will find detailed information in regard to the disinfection during the course and after the termination of cases of typhoid fever in Circular 46, which I herewith enclose.

Legal Responsibility of Physicians. To a local board.

I send you with this a copy of "Abstract of the Health Laws." On page 4 I mark section 13 which enumerates the diseases which, under the original law, it was the duty of the local board of health to report. You will see that this section makes it the duty of the physician to report cases of typhoid fever. Under the law of 1895, which you will find on page 7, it is provided that the physician shall report other diseases which you will find named in section 2. The penalty for not reporting is prescribed in section 26 on page 7.

In case of the failure of a physician to report a case of typhoid fever or any other prescribed disease, section 2 on page 8 tells you what to do. Under this section 2 you should work up any such case, being sure that you have evidence which will probably convict, and then turn the case over to the county attorney.

In the case of the physician of whom you speak, I should if I were in your place, have a talk with him, and ask him whether he has said that he will not report a case of contagious disease. Unless he will promise to report cases in the future and does as he agrees, I should report the present case to the county attorney.

MEASLES.

Measles in a Boarding House.

Answer.—In regard to the case of measles at the boarding house, I would say that it is advisable to make some arrangements, if you find it practicable to do so, to isolate the patient and prevent the spread of infection. I should think, however, that there is great danger that infection is already spread for the reason that measles is infectious for several days before the rash comes out, and while the patient supposes that he has nothing but a bad cold in the head. If you find that exposure has already taken place, and that there will probably be other cases, you should take measures to prevent the conveyance of infection to the schools. Put a copy of Forms 51 and 53 into the hands of each teacher, and instruct the teacher to exclude all infectious persons. It would be well also, to exclude all children who have symptoms of a bad cold in the head until after two or three days when it can be determined whether they are to have measles or not.

In some of the sections of the law under which local boards of health act, measles is not one of the specified diseases, but local boards of health have authority under section 7, paragraph III, to take such measures to guard against the spread of measles as may seem necessary and reasonable.

Question.

Is the disease measles quarantinable?

Answer.—In answer to your inquiry I would say that a local board of health has ample authority to take such measures as it deems necessary to protect the public from the danger of the infection of measles. These preventive measures may include quarantine.

To a Local Board.

I have just received a letter which indicates that measles is very prevalent in your town, and that the old, the middle aged,

and the young are dying from this disease, and that your local board of health is doing nothing.

Your local board of health has ample authority to take measures against the spread of measles, and if it is true that the disease is prevailing in a severe form, it becomes doubly the duty of your board to do what is possible against the further spread of measles. I would suggest that in this work you make a wide distribution of Circular 50 which should awaken the public to a realizing sense of their wrong doing in not being careful not to spread the infection. Please report to this office in regard to the matter.

Question from Secretary of Same Board.

Measles are quite prevalent here. Will do everything possible to stop the spread of the disease. Have we authority to quarantine houses? Please forward a supply of Circular No. 50 and I will distribute them at once.

Answer.—I would advise you in connection with the outbreak of measles carefully to exclude all infectious persons from the school buildings, if your schools are in session. You should also require the coöperation of the teachers in this work. You can instruct them by putting copies of 51 and 53 into their hands. Furthermore, I would advise you to placard the houses so that other persons may know where the cases are, and, although you may not deem it necessary to enforce so strict a quarantine as in scarlet fever and diphtheria, leaving their homes, running around, and visiting by unnecessary persons, should be discouraged, and if necessary prohibited. I send you a supply of circulars, etc.

You have ample authority to quarantine houses or persons, although it has not been generally customary to institute so strict a quarantine as for the two other diseases which I mention.

Quarantine.

When the local board of health knows of the first case or cases of measles in an outbreak it is very desirable that the cases be quarantined. By so doing an extended outbreak may sometimes be prevented. When, however, the disease becomes quite extended, local boards of health find it a hard job effectually to quarantine with this disease. One great trouble is that measles is infectious about four days before the eruption occurs, when the patient is often supposed to be suffering from the symptoms

merely of a cold in the head. All infectious persons should strictly be excluded from the schools, and the same should be said of persons who associate with cases of measles. See "Measles" in Circular 53.

WHOOPIING-COUGH.

To Secretary Local Board of Health.

A complaint comes to this office that there has been great carelessness in your town in regard to the spread of whooping-cough. I write to advise you to take such measures as in the judgment of your local board are necessary to prevent too much carelessness. Whooping-cough is a very dangerous disease for infants, and every precaution should be taken by the heads of families and everybody else to prevent the bringing of infection to houses where there are very young children. It is particularly dangerous at this season of the year. More deaths have been caused in this State some years by whooping-cough than by scarlet fever. I send a packet of Circular No. 50, which will give the people information in regard to infectious diseases generally. The rules given there may be applied to whooping-cough.

CHICKENPOX.

To Secretary of a Local Board.

We have no placards for chickenpox, and it is not a disease which we quarantine. It is hardly worth while for local boards of health to trouble about that disease excepting when there may be a possibility that cases reported to be chickenpox may be mild cases of smallpox—smallpox in a modified form. If the cases should be unusually severe for chickenpox and have more eruption than is usual for that disease, and particularly if the cases should occur among adults, it might be well to have a physician see the cases. The special order was issued by the State board of health because many outbreaks of smallpox have been called chickenpox at first.

To a Local Board.

If there should be anything in those cases of chickenpox which is somewhat unusual for chickenpox—more than ordinarily severe illness, or fever, and unusually profuse eruption, particularly if in adults, it would be well for you to have a physician see them, or otherwise be pretty sure of the diagnosis.

To a Local Board.

It is not customary to take any stringent measures against the spread of chickenpox, but it is at least desirable for local boards of health to exclude from the schools pupils who have this disease. The most serious trouble caused by chickenpox is its liability to be mixed up with smallpox. It is an old and frequently repeated experience with our board to find that mild cases of smallpox, like the most of the cases which have prevailed in the last two or three years, are called chickenpox by attending physicians. I saw some similar cases yesterday in ———, six, the earlier ones of which being very mild had been called chickenpox. The same thing has just happened in ———, where many persons have been exposed to smallpox because the earlier cases were supposed to be chickenpox. It would be a serious thing for the prosperity of your place to have a similar mistake made there.

DISEASES OF ANIMALS.

Glanders.

It is the duty of your local board of health to report the case of glanders to the cattle commissioners. Hon. F. O. Beal of Bangor is the nearest member to you. The members of your board should run no personal risk by ordering the slaughter of the horse, but so far as you deem the case is dangerous to the public, you can give orders in regard to the case, about the care or, I presume, the quarantine of the animal.

Hog Cholera.

Hog cholera is a very infectious disease and every farmer in your neighborhood should keep away from the vicinity of infection, or there will be danger of carrying it to their own animals on their clothing or on their shoes. I think your local board would have no authority in the matter. I have forwarded your notification to the cattle commissioners, but I am not sure what action they are authorized to take.

Bovine Tuberculosis.

There is no way in which a person can tell from the symptoms whether some cows have tuberculosis. In some cases, in which the cow is manifestly out of condition and has a cough, one may be pretty sure what the trouble is. In other cases, in which the symptoms are not so distinct, a veterinary surgeon or other person who is skilled in examining cases of this kind, can deter-

mine the nature of the disease, and in nearly all cases the question is decided absolutely by the tuberculin test. I send you a copy of Circular No. 30. Under tuberculosis you will find some of the symptoms given. Many cows, however, quite badly diseased with tuberculosis, do not show it in their general appearance until they have had the disease some time. The best way for you to do, if you have reason to suspect that your cow has tuberculosis, is to notify the cattle commissioners. They will, perhaps, send a veterinary surgeon to examine the cow, if, from your description they deem it likely that she has tuberculosis.

Suspected Glanders and Disinfection.

It is a little out of my line of work, but so far as I can do so, I am glad to help you.

Dr. Bailey, State veterinarian, could advise you as to the nature of the disease better than I can. It is apparently an infectious disease, but from your description of the symptoms, I should not venture to make a diagnosis. I am afraid it is glanders. Glanders exists in both the acute and chronic forms and the chronic form sometimes is merged into the acute, and the rapidly fatal form. This may result from exposure as appears to have been the case in one of your spans. I would, however, advise you to communicate with Dr. Bailey,—Dr. G. H. Bailey, Deering, Maine.

As to disinfection, I should not want to trust to sulphur fumigation for any part of the work. In an ordinary stable the construction is not close enough to permit of disinfection with gaseous agents, and under any circumstances the fumes of sulphur would be inefficient.

The experimental work that has been done in this direction indicates that the bacillus of glanders is very difficult to kill. If the stable were my own, I should disinfect the stall by ripping out all of the wood-work including the partitions, cribs, floors, and the ceiling, if it is thought that there has been any possibility of the animal blowing the discharges from its nostrils upon the ceiling. The upper floor particularly should be removed, because it would be likely to harbor in the cracks so much of the infectious dust and other infectious material. The lumber which is ripped out should be burned. In renovating old stalls, probably infected with glanders, it would be advisable to wear leather gloves, or at least see that the skin of the hands is unbroken.

If you should object to ripping out the wood-work and wish to trust to disinfection, I should advise you to proceed as in A.

A.—Wash and scrub the surfaces with solution 7 (see page 8 of Circular No. 68) putting in at least 8 ounces of the solution of formaldehyde instead of 6 to the gallon. In scrubbing up the floors and other surfaces in tight rooms 6 ounces is about as strong a solution as the eyes can stand. It will cause no injury to the eyes only a temporary smarting.

Then in a day or two I should mop or brush all of the surfaces with lye of wood ashes, setting up your leach and making the lye as you would for soft soap. Mix the first or stronger part of the lye which comes through first with about three parts of water, and the later portion with about two parts before you apply it. It would be more efficient applied as hot as is practicable.

If it is not convenient for you to get solution of formaldehyde (formalin) proceed as in B. Solution of formaldehyde is now obtainable in some places for 50 cents, or less, per pound or pint. I am afraid your local druggists, if they have it, would have to charge you somewhere from 75 cents to \$1.00.

B.—Get crude carbolic acid which is cheap. Make a strong soap solution, using preferably common soft soap,—putting in about one part soap and three parts soft water. Heat the solution of soap and water quite hot and add to each gallon of it one pint of crude carbolic acid. Mix thoroughly and use as hot as practicable.

After a few days apply the solution of lye in the same way as under A.

The lime wash is quite effective for most kinds of infection, but it is not very trustworthy applied to the infection of tuberculosis and glanders.

If the hay in the loft in your stable is quite remote from the stall, as you say it is, I should apprehend no danger from it. If, however, there were any probability that it was infected with the infection of glanders it could be safely fed to cattle.

Disease of Sheep.

Last spring I turned my sheep out into a very damp pasture without trimming their feet as usual, and when I got them home in the fall, some of them were quite lame. I had their feet trimmed quite close and wet them in a solution of blue vitrol.

Some said it was foot rot. Can you send me anything telling about foot-rot? Is it catching?

Answer.—I cannot tell you whether the trouble is the foot-rot of sheep or not. If that was the trouble, your description of the symptoms indicate only a very slight prevalence of the disease. The foot-rot of sheep is very contagious; it is easily spread from one animal to another.

I send you a pamphlet, on page 12 of which you will find a short description of the foot-rot in sheep. If the trouble in your flock continues and appears to be serious, it would be well for you to consult a veterinary surgeon about the matter.

In a case of foot-rot in sheep, probably a solution of lysol, about one per cent. solution, would be the best application. For foot and mouth diseases of cattle and sheep, a solution of lysol poured into a shallow vat or a slight hollow in the ground, made tight with puddled clay, has been used by driving the animals into it and letting them stand in the solution a little while, the depth of the solution being just enough to come above the hoofs.

WATER AND WATER SUPPLIES.

Galvanized Iron Pipe.

Answer.—I should apprehend no serious results from the use of water pumped through any moderate length of galvanized iron pipe. For some time after such pipe is put into use, the water dissolves the zinc and has rather a disagreeable styptic or metallic taste, and upon standing a slight opalescent scum forms on the surface. When boiled, a slight milky appearance is developed in the water. This trouble will usually pass off in a longer or shorter period of time, depending mostly on the freedom of the flow of water through the pipe.

The authorities are not unanimous on the question of whether water which contains zinc is injurious as a drinking supply; some claim that it is and others that it is not. If your well is connected with a pump, it would be well for you to pump a portion of the water before you take some for use, thereby getting rid, in a large measure, of the unpleasant taste and appearance of the water.

On Choice of Pipe.

Answer.—As regards the kind of pipe, galvanized iron, upon the whole, seems to be the best metal to choose. Good galvan-

ized iron pipe rarely gives trouble by rusting. For a while, however, after it is put in, the water dissolves the zinc so that it is a little unpleasant. After a while that trouble ceases.

In using lead there is quite an element of danger. Quite frequently, I hear of cases of chronic lead poisoning to the users of the water that has been brought through lead pipe. Lead poisoning is quite a serious matter, and personally, I should not want to take any chances with it. My advice to you would be to use galvanized iron.

FOOD SUPPLIES.

To a Local Board.

The duty of a local board of health in connection with adulterated milk or unhealthful milk supplies is not clearly defined, or rather I should say, is not defined at all. If milk is adulterated the law should clearly prescribe that it is the duty of a local board of health to take action, but any attempt to work under the existing law relating to milk supplies or adulterated milk supplies does not have a very good chance of success. The law is very faulty, and again there is no State laboratory as there should be to which you can send samples.

DISINTERMENT.

Answer.

We haven't much law in this State relative to the disinterment and removal of the remains of persons who have been buried. The town clerk is authorized to issue a permit for the removal, but though that matter is not expressly defined in the powers and duties of local boards of health, they probably have authority to forbid the removal of the remains of persons who have died of infectious disease, when they deem it dangerous for the disinterment to take place. If the remains are to be transported by rail, or by other common carriers, it would of course be necessary for you to know their rules and regulations, and if the body is to be transported to another state, you should learn about the state or municipal regulations which might possibly delay the transportation.

To Secretary of Local Board.

In removing the remains of the bodies of the two persons who died of scarlet fever eighteen years ago, I should think that it

would be a sufficient precaution if the remains are simply deposited in a new box, transported through the village at night or early in the morning before many persons are astir, and have the workmen who attended to the disinterment and transportation change and disinfect their clothing after they have finished their work. It would be well to have the work done by some persons who have no small children in their own families.

PUBLIC HEALTH DUTIES OF POSTMASTERS.

Questions.

Has a person any right to send letters to a postoffice from a house where there are scarlet fever patients? Has a postmaster any right to refuse to take letters sent from a house where scarlet fever reigns? What I mean is, may he refuse to enclose them and send them in the mail bags?

Answer.—I enclose with this a copy of the United States postal laws relating to infectious diseases. That will answer some of your questions.

Letters written in a house where there are cases of scarlet fever should not be sent to the postoffice without disinfection in some way which will be satisfactory to the local board of health. There are numerous histories of the transmission of scarlet fever from one place to another through the medium of letters. Letters can be disinfected as follows: Into a small box which can be closed up and made air-tight, the infected letter should be placed. Into the box by the side of the letter a quantity of formaldehyde solution (formalin) should be poured upon an old handkerchief, or some piece of cloth to absorb it. The cover should then be put on tightly; it should be sealed up or pasted up, or otherwise be made air-tight, and should thus remain five or six hours at least. The quantity of formaldehyde solution to use must depend upon the size of the box. There should be at least one ounce for each cubic foot of space, but if the box were a small one, say 8x4x2 inches, a teaspoonful or so of the solution would be sufficient.

Some of your other questions are answered in the marked sections of the law which you will find on pages 4 and 5 of "Abstract of the Health Laws" which I send you.

U. S. Postal Law Relating to Infectious Diseases.

1. A postmaster should refuse to receive into his office mail matter brought to it by persons who are inmates of, or messen-

gers from houses containing cases of contagious diseases, such as smallpox, yellow fever, etc., when ordered to do so by a board of health, or other local authority having jurisdiction of matters affecting the public health. If there be no such organization or official, the postmaster should be governed by the advice of one or more reputable physicians.

2. Mail matter arriving at an office addressed to the inmates of such houses may be sent to them by the hands of some responsible person known to the postmaster.

3. When a board of health serve upon a postmaster a certified copy of a declaration or order duly made that mail matter from any other postoffice is liable to communicate a contagious disease prevailing at the time, he should refuse to receive such mail matter from any carrier or messenger, but will deliver to the carrier or messenger a copy of such order or declaration and will report the facts at once to the first assistant postmaster general. If there be no board of health the same action may be taken by the postmaster upon the declaration of a regular county or city medical society, or, if there be none, upon the advice of a physician reputable in his profession. The mail so returned shall be held until the prohibition is removed, and shall, after being properly fumigated under the directions of the medical authorities, be dispatched to its destination.

4. If a case of smallpox, yellow fever, or other contagious disease occurs in the family of a postmaster occupying the building in which the postoffice is kept the postmaster should notify his sureties to take possession of the office and conduct it temporarily elsewhere until the danger of contagion is passed.

NEW CIRCULARS.

CIRCULAR No. 71.

STATE BOARD OF HEALTH OF MAINE.

ON THE MANAGEMENT OF OUTBREAKS OF SMALLPOX.

When smallpox or persons who have been exposed to smallpox come into your town, act quickly. When there are rumors of infectious persons or things, investigate at once.

The *powers* of local boards of health are ample enough in almost any contingency. See Sec. 7, on page 2, of "*Abstract of the Health Laws*;" Sects. 8 and 9, page 3; and Sects. 1 to 10, pages 9 and 10.

The *duty* of the board is to act promptly. The whole matter is in the hands of the local board. No time should be wasted in running around to get the consent or approval of the municipal officers or anyone else. Your town will be obliged to pay all reasonable and honest bills, and the more promptly you act the smaller the bills will be.

If any person breaks quarantine, violates the provisions of the health laws, or interferes with the work of the board so as to prevent the execution of the provisions of the law, have him arrested at once. If infectious, he can be held in any kind of a "shack" until he can be disinfected and brought before a justice for trial.

Suspects, or Exposed Persons.

Trace out as speedily as possible every person who has been exposed to the infection of smallpox. Make a note of the date of exposure.

When located, vaccinate every such person as soon as possible. Vaccinate also all of the members of his family or of the household in which he lives.

As to the question of quarantining a person who has been exposed to smallpox:

If he is a transient, keep him under close quarantine. If he is a permanent resident and trustworthy, keep him under observation.

Persons who have been exposed to smallpox should be considered under two classes:

(1) Those who have been exposed but once to the infection and are immediately vaccinated. These should be kept under observation until there are unmistakable evidences of the success of the vaccination, when they can be discharged from further surveillance.

(2) Persons who have been exposed to smallpox and several days (over four) have elapsed before vaccination. These should be kept under observation sixteen days from their last possible exposure. The wearing of their own infected clothing should be deemed a continuation of their exposure.

As soon as a person has been isolated on account of exposure to smallpox, give him a change of clothing (in warm weather, overalls and a blanket may suffice), have him disinfect his hands, face, and beard, at least, by washing in a 1 : 1000 solution of corrosive sublimate. Disinfect his clothing as soon as possible and have him put it on again.

Persons who are under quarantine or under observation on account of exposure to smallpox should be inspected by a physician at least once daily during the period of incubation.

Vaccination.

In the vaccination of persons who have been exposed to smallpox, "time is money." The failure of prompt vaccination sometimes costs towns much money. The persons exposed and all members of their families should not only be vaccinated as quickly as possible, but the vaccination should be done again and again, if necessary, until a "take" results, or there are other good reasons to believe that all these persons are fully protected.

Prompt vaccination is required for the exposed person that the vaccination may get ahead of smallpox and modify it or prevent it entirely, and for the persons housed or associated with him

the aim should be the speediest possible "takes," so that these persons may be fully protected if the person already exposed develops smallpox.

If, after persuasion and reasoning with them, suspects refuse to be vaccinated, apply an absolute quarantine, just as long as may be necessary.

As to the method of doing vaccination, see Circular No. 67.

As to the value of vaccination, it may be said that the protective power of a recent and successful vaccination is nearly if not quite as absolute as that from a previous attack of smallpox. See Circular No. 27.

Even if not recently vaccinated, the health officer need not hesitate to attend promptly to any duty which an emergency may present. If he is exposed to smallpox and is carefully vaccinated soon afterward (within one or two days, although the sooner the better) the vaccination, on account of its more rapid development will get ahead of the smallpox and prevent it.

Quarantine.

The quarantine of every smallpox patient should be prompt and absolute. There should be a guard placed over every infected house day and night, and special visits should be made at unexpected hours to see whether the guards are doing their duty faithfully.

Transient suspects should also be quarantined as under "Suspects."

Nurses.

When it is known that persons have been exposed to smallpox, the local health officers should promptly arrange for the worst. Facilities for the quarantine and the treatment of the sick should be considered before the actual cases are on hand. Nurses and medical attendants should conditionally be engaged in advance.

For nurses, have persons who have had smallpox, or who are thoroughly protected by a recent successful vaccination.

Hospitals and Camps.

When smallpox breaks out, the question will often arise whether the sick shall be kept and cared for in their houses, or the houses in which they are found, or shall be removed to other quarters. When practicable to do so, their removal is desirable.

If removed, the house from which they are taken should be disinfected with the least possible delay.

When a house is not available as a hospital, a temporary camp or shed may quickly be built, which will be safe and comfortable for patients and attendants.

Persons who have been exposed to smallpox and persons who show uncertain symptoms of the disease should not be confined with smallpox patients, until the diagnosis of smallpox is clear.

Disinfection.

The rules for disinfection given in the circulars for scarlet fever and diphtheria and in Circular No. 68, are applicable to smallpox, with perhaps one exception. Sulphur fumigation simply as a disinfection of surfaces, is more trustworthy in smallpox than in diphtheria, and some other diseases. That is the experience of numerous practical public health officers. But it has even less power of penetration than formaldehyde. When available, formaldehyde is always preferable.

If it is deemed best to do so, a preliminary disinfection may be done with formaldehyde or sulphur fumigation as the first step in the disinfection of a room; but a final and trustworthy disinfection with either of these gases can be done only after the room is cleared, or partly cleared, of its contents—particularly clothing, bedding, rugs and carpets—as is directed in Circular No. 68.

To disinfect a room with formaldehyde, close all openings, especially those around doors and windows, by stuffing with cotton or by pasting paper over the cracks. Close tightly ventilators and fireplaces. Formaldehyde solution as a source of the disinfectant gas is preferable to wood alcohol, and at its present prices, bought in quantity, is nearly, if not quite as economical as wood alcohol or sulphur. Vaporize 250 cubic centimeters (one-half pint at least) for each 1,000 cubic feet of space. Close the rooms tightly eight hours or more.

To disinfect with sulphur, close all openings as is advised for formaldehyde. Leave one door for the escape of the disinfector. Into each room to be disinfected, put a tub partly full of water; and into each tub put an iron pot capable of containing double the amount of sulphur required. Put into each pot sulphur enough to give 5 pounds for each 1,000 cubic feet of air space. Pour on a small amount of alcohol; see that the sulphur is thor-

oughly ignited, then leave the room; close the door and stop all the cracks. Leave the room closed for twenty-four hours.

If the room is too open to admit of disinfection with the above mentioned gases, it must be thoroughly washed down with Solution 6 or 7. Every portion of the room should be thoroughly wetted with the solution, and the room should not be occupied for twenty-four hours. The doors and windows should be left open to facilitate drying.

A steam disinfecter should be at hand if possible. Any good tinman can make a portable steam disinfecter such as is described on page 6, of Circular No. 68.

Brief Points for Non-Medical Members of Boards of Health.

The period of incubation of smallpox—time from exposure to the first symptoms of the disease—is twelve days on the average. It may be longer or shorter. In about three days more the eruption begins to show as small red specks, and then as pimples or papules, at first on the forehead and wrists, gradually extending over the body so that the eruption becomes general in about twenty-four hours. On the fourth and fifth days of the disease (counting from the first symptoms) the eruption is papular, and the characteristic “shotty” sensation is obtained by passing the fingers over the skin. During the next twenty-four hours the papules become vesicles, with clear summits. From the sixth to the eighth day these vesicles or watery blisters become yellow, and the eruption has then become pustular, the pustules often presenting a slight depression in the center, that is, they are “umbilicated.” The fever having declined when the eruption first appeared, now rises again. Severe pain in the small of the back is somewhat characteristic of smallpox. In modified smallpox or varioloid, the eruption aborts at various stages, or fails to follow a typical course.

Smallpox is intensely infectious, but less so in the earliest stages of the eruption. The patient is infectious until the skin is entirely cleared of crusts and the desquamation of the pox-marks has ceased.

The following maxims issued by the United States Marine Hospital Service are worthy of a place in the top of the hat of every health officer:

"Smallpox cannot be suppressed without the expenditure of money.

"The more promptly you act the less it will cost.

"When in doubt act on the safe side.

"Finally, the following motto is offered for your banner in smallpox work:

"ISOLATE. VACCINATE. DISINFECT. Vaccinate with glycerinated lymph."

FORM 67.

THE TECHNIQUE OF VACCINATION.

[EDITION OF 1901.]

ISSUED BY THE STATE BOARD OF HEALTH OF MAINE.

It has been thought advisable to offer the following suggestions as to certain points to be observed in the actual use of the lymph, and stress should be laid upon the observance of certain requirements; first, because any person whom we inoculate with the virus of an infectious disease, though an attenuated one, is entitled to all the protection from possible ill results which careful management can secure for him; and, second, because as simple a matter as vaccination is, it requires a knowledge of the technic of the operation, and the observance of certain precautions, which, if wanting, may result in non-success or in an abnormal course of the vaccinal disease.

Use only animal lymph, as fresh as possible and only from producers of known reliability.

Dried lymph upon points, glycerinated lymph in tubes, or upon points, and the glycerinated pulp in tubes and upon points are all serviceable.

The glycerinated forms are least likely to be contaminated by undesirable organisms and give the greatest percentage of successful results in all cases.

Points should be used as soon after coating as possible, and all kinds should be kept in a cool dry place and carefully protected from the light.

Use no form that does not bear the date of collection if attainable, the number of the animal from which it was taken, and the date limiting its use. Never use lymph which has in it even the slightest admixture of blood.

Before handling either points or tubes, have the hands scrupulously clean.

In opening and handling points, avoid any contact of their dipped ends with the fingers, or with anything else that may convey foreign matter to them.

Usually it is unnecessary to sterilize the site of the vaccination by chemical germicides. They are likely to destroy the efficiency of the lymph.

A prerequisite is a clean skin, and this may usually be secured by the application, when necessary, of soap and water, followed by alcohol to remove all traces of the soap.

If circumstances seem to demand the use of a germicide, use alcohol and boiled water freely to remove all traces of it, before vaccinating.

Avoid the use of any but the simplest instruments for the denudation of the skin. Needles are cheap and efficient and may be easily sterilized before using by passing through a flame. A fresh needle should be used for each person vaccinated. If a scalpel is used, scrape the epidermis, do not cut it.

It is only necessary to produce a denuded surface through which serum will ooze. Bleeding is to be avoided.

Do not scarify large areas. Intensity of inflammatory action is thereby favored. Make the denudation not over one-quarter of an inch square and if glycerinated lymph is used, even smaller. Make two or three of them, especially if it is a revaccination. Make them an inch or more apart, and so avoid coalescence of the vesicles. In primary cases when glycerinated lymph is used, one area of scarification is sufficient.

If dried lymph on points is used, moisten it by dipping the point in water that has been boiled, and lay it aside for the lymph to soften while the denudation is being made. Wipe the lymph from the point upon the raw surface, and then rub it in with the flat side of the point.

If moist glycerinated lymph on points is used, apply in the same manner, omitting the preliminary softening, or the scarifying may be made with the charged point.

If glycerinated lymph or pulp in tubes is to be used, wipe the tube with a clean damp cloth or bit of absorbent cotton. Insert it through the rubber bulb furnished for that purpose, break off one end and draw the tube back till the bulb is over the open end; then break off the other end and express the lymph, by compressing the bulb, allowing it to drop upon the denuded surfaces. Do not expel the lymph by blowing. Salivary infection of the wound is a possibility. Rub the lymph in thoroughly with the needle, the flat surface of the scalpel, or a sterilized wooden spatula, or it may be pricked in, as in tattooing.

Allow nothing to come in contact with the vaccinated area until it is dry. If the underclothing is clean, the sleeve may be drawn down without further delay. Otherwise, a soft covering of sterilized gauze or some one of the ventilated shields may be laid lightly over the arm without pressure and held in place by an adhesive strip. The leg is an undesirable location for vaccination because of the greater liability of infection.

If possible, inspect each vaccinated person by the seventh day. If unsuccessful or atypical, revaccinate, especially if there has been exposure to smallpox. Repeated vaccination in primary cases rarely fails eventually to secure a typical vesicle.

Caution the vaccinated person, or if a child, its parent, to guard against premature rupture of the vesicle. Experience shows that the great proportion of septic inflammations and eroding ulcers is due to infection introduced *after* the development of the vesicle.

Note every thing which bears upon the purity and reliability of the lymph. If untoward effects, irregularities or abnormalities occur in other cases vaccinated with the same lymph, change to some other product.

Vaccinate every child during its first year of life, again between the age of ten and fourteen, and once again after puberty.

Always vaccinate and revaccinate anyone exposed to smallpox, regardless of the previous vaccinal history. Advise it generally during any prevalence of the disease.

Record the names of all persons vaccinated, the date of vaccination, the results, and the number of the package used. These facts are useful for reference, especially the latter, if question arises as to the purity of the material used.

WATER ANALYSIS.

The following tabulation gives the results of the chemical examinations of samples of water which were made during the two years. As may be seen, only a few analyses were done in 1901. Miss Lovejoy, who has hitherto done all work of this kind, has left the service of the State board of health, and, in the absence of any special provision for it, all laboratory work has had to be discontinued.

ANALYSES OF SAMPLES OF WATER—EXPRESSED IN PARTS PER 100,000.

Number of analyses.	Origin of sample.	Date of collection.	Total solids.	Loss on ignition.	Hardness.	Chlorine.	Free ammonia.	Organic ammonia.	Nitrites.	Nitrates.			
1477	Well, North Bridgton	1900, January	29	56	1.4	3.90	.9	.000	.002	None	.002	None	Much.
1478	Hobbs Pond, Camden	March	3	1.4	1.0	1.27	.5	.000	.007	None	.007	None	Very slight trace.
1479	Mirror Lake, Camden	March	3	2.4	4	1.69	.6	.003	.007	None	.007	None	Very slight trace.
1480	Well, Sherman	March	20	42.2	12.6	34.44	3.0	.001	.007	Trace	.007	Trace	Much.
1481	Well, Augusta	April	2	16.0	6.4	8.86	2.2	.007	.028	Trace	.028	Trace	Much.
1482	Water supply, Calais	April	2	3.6	1.2	1.95	.4	.001	.016	Trace	.016	Trace	Much.
1483	Well, East Northport	April	6	23.4	8.2	12.56	5.8	.243	.018	Trace	.018	Trace	Trace.
1484	Well, Bangor	April	6	20.6	10.8	18.02	3.8	.000	.003	Trace	.003	Trace	Much.
1485	Well, Bangor	April	6	13.8	4.4	8.86	1.8	.001	.003	Trace	.003	Trace	Much.
1486	Well, Pittsfield	April	6	26.8	6.6	22.02	2.4	.125	.035	Trace	.035	Trace	Much.
1487	Well, Pittsfield	April	6	5.8	1.8	3.90	.4	.001	.007	Trace	.007	Trace	Heavy trace.
1488	Water supply, Pittsfield	April	6	5.8	9.2	3.25	.2	.001	.007	Trace	.007	Trace	Trace.
1489	Well, Pittsfield	April	6	50.6	25.8	26.62	2.4	.000	.002	Trace	.002	Trace	Trace.
1490	Spring, Dover	April	8	4.0	7.8	3.51	1.0	.000	.007	Trace	.007	Trace	Very slight trace.
1491	Spring, Grafton	April	12	22.0	1.2	6.71	1.2	.001	.007	Trace	.007	Trace	Much.
1492	Well, Sheep Falls	April	11	12.8	2.4	3.90	.6	.004	.007	Trace	.007	Trace	Much.
1493	Spring, Skowhegan	April	14	7.0	2.4	1.95	1.2	.000	.001	Trace	.001	Trace	Trace.
1494	Spring, Augusta	May	23	11.6	5.8	8.14	1.2	.000	.002	Trace	.002	Trace	Trace.
1495	Well, Monmouth	May	3	14.2	3.8	12.56	4.0	.000	.007	Trace	.007	Trace	Much.
1496	Well, Augusta	May	8	35.6	13.4	12.56	4.0	.000	.007	Trace	.007	Trace	Much.
1497	Well, Augusta	May	8	3.8	1.8	1.69	.4	.000	.007	Trace	.007	Trace	Much.
1498	Spring, Yarmouth	May	8	3.8	2.0	1.43	.3	.000	.000	None	.000	None	Trace.
1499	Spring, Augusta	May	11	30.4	10.0	19.29	4.4	.000	.004	Trace	.004	Trace	Heavy trace.
1500	Well, Pittsfield	May	10	34.0	16.8	10.30	4.4	.001	.003	Trace	.003	Trace	Much.
1501	Well, Pittsfield	May	10	12.6	6.0	5.29	.6	.000	.002	Trace	.002	Trace	Much.
1502	Well, Pittsfield	May	10	33.4	9.4	25.12	1.4	.044	.007	Much	.007	Much	Much.

1541 Well, Canton	16,	89.2	7.8	6.71	15.4	.004	.003 Very slight trace.	Much.
1542 Spring, Berry Mills.	May	14,	8.8	2.0	8.14	.8	.026	.003 Much.
1543 Well, Lisbon Falls.	May	21,	7.4	3.6	3.80	.8	.001	.003 Trace.
1544 Well, South Berwick.	May	23,	12.6	4.0	6.29	2.0	.001	.003 Very slight trace
1545 Spring, Bangor	May	20,	8.4	3.4	6.29	.4	.001	.002 Very slight trace
1546 Well, Auburn	May	23,	5.3	2.6	9.25	.2	.001	.003 Very slight trace
1547 Lily Pond, Rockport	May	29,	11.6	5.0	7.86	.9	.003	.017 Very slight trace
1548 Spring, Cherryfield.	May	10,	6.0	4.0	2.34	.6	.001	.002 Very slight trace
1549 Spring, Manchester	May	30,	8.8	2.4	5.71	.3	.001	.001 Very slight trace
1550 Well, Pittston	June	9,	10.0	4.0	6.71	.6	.004	.003 Very slight trace
1551 Well, Lowell	June	14,	3.2	1.4	1.69	.2	.003	.002 Very slight trace
1552 Well, Canton	June	14,	5.6	2.2	3.60	.3	.004	.002 Very slight trace
1553 Spring, Jackson	June	15,	4.2	2.0	2.60	.3	.003	.011 Very slight trace
1554 Spring, Milford	June	14,	4.2	1.6	2.73	.4	.003	.002 Very slight trace
1555 Spring, Saco	June	14,	3.0	2.2	.95	.3	.001	.002 Very slight trace
1556 Spring, Hope.	June	18,	4.8	1.2	2.32	.3	.001	.002 None.
1557 Spring, Augusta	August	6,	38.6	15.2	22.02	.8	.025	.009 Heavy trace.
1558 Well, Washington	August	4,	11.2	3.6	6.29	1.4	.003	.002 Trace
1559 Well, York Harbor	August	4,	19.0	8.8	6.71	1.8	.001	.003 Very slight trace
1560 Well, Popham Beach.	August	7,	197.4	36.2	34.4	77.0	.007	.003 Slight trace
1561 Well, Sebago Lake	August	9,	10.8	5.4	2.60	1.8	.001	.002 Slight trace
1562 Well, Montague	August	8,	6.4	4.0	2.60	4.4	.007	.002 Slight trace
1563 Well, Montague	.....	66.2	32.4	21.19	4.4	.017	.002 Trace	
1564 Well, Montague	.....	17.2	9.4	6.71	2.8	.004	.002 Very slight trace	
1565 Well, Montague	.....	6.6	3.2	2.98	4.4	.001	.002 Very slight trace	
1566 Spring, Portland	August	10,	8.4	3.2	3.25	2.2	.003	.007 Very slight trace
1567 Well, Portland	August	10,	8.6	3.2	2.60	1.2	.001	.003 Very slight trace
1568 Well, Gray	August	11,	4.6	2.4	2.60	1.3	.001	.002 Slight trace
1569 Spring, Augusta	.....	14.0	2.0	12.56	1.6	.001	.006 Very slight trace	
1570 Well, Pittsfield	August	9,	31.6	17.8	15.53	3.6	.001	.002 Very slight trace
1571 Ward's Brook, Wiscasset	August	14,	40.8	7.4	14.81	4.8	.001	.003 None.
1572 Ward's Brook, Wiscasset	August	23,	6.0	3.0	1.95	.6	.006	.029 None.
1573 Well, Waterville	August	23,	49.0	10.2	22.36	3.8	.001	.018 None.
1574 Spring, Hallowell	August	20,	3.8	2.2	3.60	9.2	.000	.006 Very slight trace
1575 Well, Saco	August	25,	30.0	16.0	8.86	2.2	.006	.005 Much.
1576 Well, Saco	August	25,	14.4	5.6	3.90	1.0	.007	.005 Trace.
1577 Spring, Blanchard	August	25,	9.8	4.0	4.57	1.2	.003	.000 None.
1578 Well, South Berwick	September 11,	21.2	9.4	8.14	1.8	.007	.007 Trace	
1579 Artificial Pond, South Berwick	September 17,	7.0	4.0	3.25	7.0	.003	.002 Heavy trace	
1580 Well, Popham Beach.	September 17,	18.4	5.4	3.90	7.0	.006	.003 Slight trace	
1581 Well, East Newporth	September 26,	17.6	5.6	18.31	1.4	.045	.007 Heavy trace	
1582 Well, Falmouth	September 26,	5.4	3.2	2.99	1.8	.001	.013 Slight trace	
1583 Well, East Livermore	October 4,	13.6	4.6	2.57	1.4	.021	.002 Slight trace	
1584 Well, Richmond	October 4,	17.2	6.0	8.56	1.3	.004	.003 Very slight trace	
1585 Well, Richmond	October 5,	8.2	2.2	5.29	.3	.003	.005 Very slight trace	
1586 Well, Waterville	October 10,	20.6	5.0	16.43	.3	.001	.005 Very slight trace	

ANALYSES OF SAMPLES OF WATER—EXPRESSED IN PARTS PER 100,000—Concluded.

Number of analysis.	Origin of sample.	Date of collection.	Total solids.	Loss on ignition.	Hardness.	Chlorine.	Free ammonia.	(Organic ammonia.	Nitrites.	Nitrates.
1550	Well, Waterville.....	October 10,	22.6	3.6	11.80	1.8	.005	.005	Very slight trace.	Heavy trace.
1551	Spring, Waterville.....	October 10,	15.0	5.0	8.14	.9	.000	.002	Very slight trace.	Heavy trace.
1552	Well, Cape Porpoise.....	October 10,	78.2	18.2	14.06	10.6	.017	.019	Heavy trace....	Much.
1553	Well, Lebanon.....	October 11,	22.4	7.2	8.86	2.6	.003	.018	Very much.	Much.
1554	Well, Falmouth.....	October 25,	19.6	3.6	9.86	2.8	.021	.003	Trace.....	Trace.
1555	Well, Bangor.....	October 25,	32.6	8.2	19.60	3.0	.003	.003	Trace.....	Much.
1556	Spring, Bangor.....	October 25,	27.6	7.6	18.81	1.6	.001	.000	None.....	Very much.
1557	Well, Scarborough.....	October 30,	20.4	17.6	10.30	2.8	.017	.020	Trace.....	Much.
1558	Well, Scarborough.....	November 2,	20.4	15.4	10.30	2.8	.008	.009	Much.....	Much.
1559	Spring, Greenville.....	November 2,	25.4	4.8	22.02	.6	.000	.001	Trace.....	Much.
1560	Well, Bangor.....	November 8,	2.8	3.6	5.20	.6	.006	.002	Very slight trace.	Heavy trace.
1561	Spring, Dixfield.....	November 8,	7.8	3.6	4.57	.4	.000	.002	Trace.....	Heavy trace.
1562	Well, Brunswick.....	November 8,	3.2	3.0	4.00	.6	.003	.003	Trace.....	Heavy trace.
1563	Well, Brunswick.....	November 9,	10.2	9.6	3.30	.8	.006	.006	Very slight trace.	Heavy trace.
1564	Well, Bridgton.....	November 9,	4.8	2.2	3.25	.6	.001	.000	Very slight trace.	Heavy trace.
1565	Well, Canton.....	November 14,	8.8	1.4	4.57	.2	.001	.002	Very much.....	Trace.
1566	Well, Milo.....	November 16,	13.0	4.8	4.57	1.0	.031	.022	Very much.....	Heavy trace.
1567	Waseca Spring, Machias.....	1901. February 7,	2.8	2.2	2.34	.8	.001	.002	Trace.....	Heavy trace.
1568	Well, Hallowell.....	February 27,	16.4	3.4	12.56	1.2	.000	.000	Very slight trace.	Slight trace.
1569	Well, Waterville.....	March 12,	6.4	2.4	4.57	1.0	.001	.001	None.....	Very slight trace.
1570	Medomak River, Waldoboro.....	April 3,	2.8	2.4	1.69	.3	.000	.025	None.....	Very slight trace.
1571	Medomak River, Waldoboro.....	April 3,	3.4	2.8	1.69	.3	.001	.019	None.....	Very slight trace.
1572	Well, Oakland.....	May 26,	18.6	10.4	9.57	2.0	.088	.006	Much.....	Heavy trace.
1573	Fort Fairfield.....	.....	16.6	2.4	14.06	.2	.003	.007	Very slight trace.	Slight trace.
1574	Well, Milo.....	October 30,	23.8	9.2	8.86	4.8	.003	.010	Trace.....	Much.
1575	Well, Charleston.....	December 12,	27.6	3.8	17.22	1.2	.000	.002	Very slight trace.	Heavy trace.

ADDITIONS TO THE LIBRARY.

During the years 1900 and 1901 the following books, pamphlets, and journals were added to the library of the Board by exchange and by purchase.

BOOKS.

- Atkinson. The Science of Nutrition. Boston. 1896.
Brush. Milk. New York. 1898.
Brush. Human and Bovine Tuberculosis. New York. 1898.
Bulkley. Syphilis in the Innocent. New York. 1894.
Egbert. A Manual of Hygiene and Sanitation. Philadelphia and New York. 1898.
Fischer. Infant-Feeding. Philadelphia and Chicago. 1901.
Folwell. Sewerage. New York. 1900.
Fournier. Syphilis and Marriage. New York. 1881.
Fuertes. Water and Public Health. New York. 1897.
Gardiner. The Care of the Consumptive. New York. 1900.
Harrington. A Manual of Practical Hygiene. 1901.
Hillier. Tuberculosis. London. 1900.
Howell. An American Text-Book of Physiology. Philadelphia. 1900.
Kotelmann. School Hygiene. Syracuse, New York. 1899.
McFarland. A Text-Book upon the Pathogenic Bacteria. Philadelphia. 1900.
Miles. Farm Draining. New York. 1892.
Mitchell. Flesh Foods. London. 1900.
Mosler. Über Entstehung und Verhütung der Tuberkulose als Volkskrankheit. Wiesbaden. 1899.
Ogden. Sewer Design. New York. 1899.
Pannwitz. Bericht über den Kongress zur Bekämpfung der Tuberkulose als Volkskrankheit. Berlin. 1899.
Park and Guerard. Bacteriology in Medicine and Surgery. New York. 1899.

- Polk. Medical and Surgical Register of the United States and Canada. 1900.
- Purrington. Christian Science. New York. 1900.
- Pyle. A Manual of Personal Hygiene. Philadelphia. 1900.
- Richards. The Cost of Living. New York. 1900.
- Richards and Woodman. Air, Water and Food. New York. 1900.
- Rideal. Sewage and the Bacterial Purification of Sewage. New York. 1900.
- Solly. A Handbook of Medical Climatology. Philadelphia and New York. 1897.
- Walker. Open-Air Treatment of Consumption. London. 1899.
- Whipple. The Microscopy of Drinking-Water. New York. 1899.
- Worcester. Small Hospitals. New York. 1900.
- Index-Catalogue of Surgeon-General's Office. U. S. A. Vol. V, 2d series.
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- Schulgesundheitslehre. Berlin. 1900. Vols. I and II.
- Senate Report No. 516. Adulteration of Food Products. Washington, D. C. 1900.
- State Board of Illinois. Report of the Sanitary Investigations of the Illinois River and its Tributaries. 1901.
- Statistisches Jahrbuch der Stadt. Berlin. 1898.
- Statistique Internationale Resultant des Recensements de la Population. Paris. 1899. (Bertillon.)
- Yearbook of the Department of Agriculture. Washington, D. C. 1899.
- Transactions of the Medical Association. State of Alabama. 1901.
- Transactions of the American Climatological Association. Vol. XVI. 1900.

REPORTS.

- Connecticut Twenty-Second Annual Report of the State Board of Health. 1899.
- Connecticut Twenty-third Annual Report of the State Board of Health. 1900.

- Florida. Eleventh Annual Report of the State Board of Health. 1900.
- Florida. Twelfth Annual Report of the State Board of Health. 1901.
- Hawaii. (Ter.) Report of the President of the Board of Health. 1899-1900.
- Indiana. Eighteenth Annual Report of the State Board of Health. 1898-99.
- Iowa. Eighth Biennial Report of the State Board of Health. 1895.
- Iowa. Ninth Biennial Report of the State Board of Health. 1897.
- Iowa. Tenth Biennial Report of the State Board of Health. 1899.
- Kansas. Fifteenth Annual Report of the State Board of Health. 1899.
- Kansas. Sixteenth Annual Report of the State Board of Health. 1900.
- Louisiana. Biennial Report of the State Board of Health. 1898-99.
- Maryland. Annual Report of the State Board of Health. 1898.
- Massachusetts. Thirty-Second Annual Report of the State Board of Health. 1901.
- Michigan. Twenty-fifth Annual Report of the State Board of Health. 1897.
- Michigan. Twenty-sixth Annual Report of the State Board of Health. 1898.
- Michigan. Twenty-eighth Annual Report of the State Board of Health. 1900.
- New Brunswick. Twelfth Annual Report of the Provincial Board of Health. 1898.
- New Brunswick. Thirteenth Annual Report of the Provincial Board of Health. 1899.
- New Hampshire. Sixteenth Report of the State Board of Health. 1899-1900.
- New Jersey. Twenty-third Annual Report of the State Board of Health. 1899.
- New Jersey. Twenty-fourth Annual Report of the State Board of Health. 1900.
- New York. Nineteenth Annual Report of the State Board of Health. 1898.

- New York. Twentieth Annual Report of the State Board of Health. 1899.
- North Carolina. Eighth Biennial Report of the State Board of Health. 1899-1900.
- Nova Scotia. Seventh Annual Report of the Provincial Board of Health. 1899.
- Ohio. Thirteenth Annual Report of the State Board of Health. 1898.
- Ohio. Fourteenth Annual Report of the State Board of Health. 1899.
- Ontario. Eighteenth Annual Report of the Provincial Board of Health. 1899.
- Ontario. Nineteenth Annual Report of the Provincial Board of Health. 1900.
- Pennsylvania. Fourteenth Annual Report of the State Board of Health. 1898.
- Pennsylvania. Fifteenth Annual Report of the State Board of Health. 1899.
- Quebec. Fifth Annual Report of the Provincial Board of Health. 1899.
- Quebec. Sixth Annual Report of the Provincial Board of Health. 1900.
- Rhode Island. Twenty-first Annual Report of the State Board of Health. 1898.
- South Carolina. Twentieth Annual Report of the State Board of Health. 1899.
- South Carolina. Twenty-first Annual Report of the State Board of Health. 1900.
- Wisconsin. Eighteenth Report of the State Board of Health. 1899-1900.
- Massachusetts. Forty-sixth Report on Births, Marriages and Deaths. 1887.
- Massachusetts. Forty-seventh Report on Births, Marriages and Deaths. 1888.
- Massachusetts. Forty-eighth Report on Births, Marriages and Deaths. 1889.
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- Massachusetts. Fifty-sixth Report on Births, Marriages and Deaths. 1897.
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- Michigan. Thirty-first Annual Report on Births, Marriages and Deaths. 1897.
- Michigan. Thirty-second Annual Report on Births, Deaths, Marriages and Divorces. 1898.
- Minnesota. Fifth and Sixth Biennial Reports on Vital Statistics. 1894-1897 inclusive.
- New Hampshire. Ninth Annual Report on Births, Marriages, Divorces and Deaths. 1888.
- New Hampshire. Twelfth Annual Report on Births, Marriages, Divorces and Deaths. 1891.
- New Hampshire. Thirteenth Annual Report on Births, Marriages, Divorces and Deaths. 1892.
- New Hampshire. Fourteenth Annual Report on Births, Marriages, Divorces and Deaths. 1893.
- New Hampshire. Fifteenth Report on Births, Marriages, Divorces and Deaths. 1894-95.
- New Hampshire. Seventeenth Report on Births, Marriages, Divorces and Deaths. 1898-99.
- Ontario. Report on Births, Marriages and Deaths. 1898.
- Ontario. Report on Births, Marriages and Deaths. 1899.
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- Rhode Island. Forty-seventh Registration Report. 1899.
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- Boston. Report of Chief of Massachusetts District Police. 1900.
- Chicago. Biennial Report of the Department of Health. 1897-98.
- Lanark, Scotland. Ninth Annual Report of the Health and Sanitary Condition of the County. 1899.
- District of Columbia. Report of the Health Officer. 1900.

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 Proceedings and Addresses at the Sanitary Convention at Traverse City, Michigan. Augusta 22-23, 1899.

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- The Sanitarian. Brooklyn, N. Y. 1900-01.
- ~~The Engineering Record.~~ New York. 1900-01.
- The Sanitary Record. London. 1900-01.
- The Boston Medical and Surgical Journal. Boston. 1900-01.
- The Architects' and Builders' Magazine. New York and Chicago. 1900-01.
- Brooklyn Medical Journal. Brooklyn, N. Y. 1900-01.
- Medical News. Philadelphia. 1900-01.
- Medical Times. New York. 1900-01.
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- The American Monthly Microscopical Journal. Washington, D. C. 1900-01.
- Modern Medicine. Battle Creek, Mich. 1900-01.
- Occidental Medical Times. Sacramento, Cal. 1900-01.
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- The Medical World. Philadelphia. 1900-01.
- Journal of Medicine and Science. Portland, Me. 1900-01.
- Lehigh Valley Medical Magazine. Easton, Pa. 1900-01.
- The Virginia Medical Semi-Monthly. Richmond, Va. 1900-01.
- Journal of Hygiene. New York. 1901.
- The Journal of Experimental Medicine. New York. 1900-01.
- The Journal of Tuberculosis. Asheville, N. C. 1900.
- Therapeutic Gazette. Philadelphia. 1900-01.
- Columbus Medical Journal. Columbus, Ohio. 1900-01.
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- Dietetic and Hygienic Gazette. New York. 1900-01.
- Quarterly Journal of Inebriety. Hartford, Conn. 1900-01.
- Pediatrics. New York. 1900-01.
- American Physical Education Review. Boston. 1900-01.
- Journal of the New England Water Works Association. New London, Conn. 1900-01.

- Monthly Report of Climate and Crop Service. Boston, Mass. 1900-01.
- Monthly Bulletin of the Indiana State Board of Health. Indianapolis. 1900-01.
- Monthly Bulletin of the Iowa State Board of Health. Des Moines. 1900-01.
- Michigan Monthly Bulletin of Vital Statistics. Lansing. 1900-01.
- Bulletin of the North Carolina State Board of Health. 1900-01.
- Bulletin of the Virginia Board of Health. Richmond. 1901.
- Monthly Bulletin of the State Board of Health of Rhode Island. 1900-01.
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- The Vermont Medical Monthly. Burlington. 1900-01.
- The Municipal World. St. Thomas, Ont. 1900-01.
- New Hampshire Sanitary Bulletin. Concord, N. H. 1900-01.
- Journal of the Western Society of Engineers. Chicago. 1900-01.
- Municipal Engineering. New York. 1900-01.
- Public Health Reports. Washington, D. C. 1900-01.
- The Journal of State Medicine. London. 1900-01.
- Public Health. London. 1900-01.
- Health. London. 1900-01.
- The Lancet. London. 1900-01.
- Revue D'Hygiene. Paris. 1900-01.
- Zeitschrift für Hygiene. Berlin. 1900-01.
- Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege. Braunschweig. 1900-01.
- Deutsche Medicinische Wochenschrift. Berlin. 1900-01.
- Zeitschrift für Schulgesundheitspflege. Hamburg. 1900-01.
- Centralblatt für Bakteriologie und Parasitenkunde. Jena. 1900-01.
- Giornale della Reale Societa Italiana D'Igiene. Milano. 1900-01.
- Annali D'Igiene Sperimentale. Roma. 1900-01.
- Boletin del Consejo Superior de Salubridad. Mexico. 1900-01.

ABSTRACTS FROM THE REPORTS OF THE LOCAL
BOARDS OF HEALTH.

ABBOT. 1900. One nuisance removed. Two cases of scarlet fever.—D. M. Kimball, Sec.

1901. No contagious diseases reported this year.—E. E. Hescok.

ACTON. 1900. One nuisance removed. No cases of infectious disease.

1901. Three cases of diphtheria and one of scarlet fever. One nuisance was removed.—B. J. Grant, Sec.

ADDISON. No contagious diseases in either year except one case of typhoid fever in 1900.—U. W. Curtis, Sec.

ALBANY. We have had no work to do as there have been no nuisances reported and no cases of infectious disease.—C. G. Beckler, Sec.

ALBION. 1900. One nuisance removed. Nine cases of scarlet fever in three houses and three of typhoid fever.

1901. Two nuisances reported and removed. Three cases of scarlet fever and two of typhoid. In our cases of scarlet fever we used formaldehyde disinfection.—Dr. E. P. Day, Sec.

ALEXANDER. 1900. We have had no contagious diseases in our little town this year.—T. Varnum.

1901. No infectious diseases reported.—C. L. Brown, Sec.

ALFRED. One nuisance was removed in 1900. In 1901, free vaccination was offered and accepted by more than one hundred. No infectious diseases in either year.—C. E. Lander, Sec.

ALNA. Nothing in the way of nuisances or infectious diseases reported either year.—A. B. Erskine, Sec.

ALTON. Two cases of typhoid fever in 1901. No other infectious diseases during the two years.—H. L. McKechnie, Sec.

AMHERST. 1901. One nuisance removed and two cases of scarlet fever.—Maurice M. Sumner, Sec.

AMITY. 1900. We have had no contagious diseases in town except four cases of scarlet fever, all of which were in one house. As soon as notified, we put the family in quarantine, supplied a doctor, and, as soon as recovered, we thoroughly disinfected.—Geo. E. Nickerson, Sec.

ANDOVER. The board has had nothing to do in either year.—D. W. Barnes, Sec.

ANSON. 1900. Five nuisances removed. One case of diphtheria and two of typhoid fever. In the case of diphtheria we used antitoxin with good results. In both diseases we disinfected with formaldehyde. When cases of consumption occur, we burn the sputum.—L. P. Lincoln, Sec.

1901. Ten nuisances were reported and all removed. No infectious diseases.—J. P. Spooner, Sec.

APPLETON. 1901. Twenty cases of scarlet fever in ten houses. One case of typhoid fever. The cases of scarlet fever were in a light form.—V. O. Keller, Sec.

ARGYLE. 1900. One nuisance removed. Five cases of scarlet fever, but no other infectious diseases.

1901. Four cases of typhoid fever in one house.—J. M. Freese, Sec.

ARROWSIC. No nuisances or infectious diseases reported to the board either year.—J. McFadden, Sec.

ASHLAND. 1900. Two nuisances removed. Fifteen cases of scarlet fever, but no other infectious diseases. No cases of diphtheria for the past ten years. In cases of pulmonary tuberculosis, the State board of health circular thereon has been freely distributed.

1901. Three nuisances reported and removed. Thirty-nine cases of diphtheria, twenty-five of scarlet fever, and two of typhoid fever. In our outbreak of diphtheria, antitoxin was used in twenty-seven cases including four of diphtheritic croup. There were sixty-six immunized, and of these, one developed the disease thirty-one days after injection of 500 units antitoxin. We disinfected with formalin and by boiling. About one hundred and eighty people were vaccinated.—Dr. H. L. Dobson, Sec.

ATHENS. 1900. One nuisance removed. There have been no cases of contagious diseases in town the past year.—L. C. Elliott, Sec.

1901. No work has been required of the board of health in this town this year as we have had no infectious diseases.—J. H. Curtis.

ATKINSON. 1900. One case of scarlet fever, but no other infectious diseases.—J. C. Campbell, Sec.

1901. No nuisances or contagious diseases reported.—Geo. D. Lyford, Sec.

AUBURN. 1900. Ten nuisances removed. Twenty cases of diphtheria, four of scarlet fever, and five of typhoid fever. In families where consumption exists, we have distributed Circular No. 54, revised edition of 1900, and have given instructions to follow directions of same.

1901. Twelve nuisances reported, all of which were removed. Sixteen cases of diphtheria, eight of scarlet fever, and twelve of typhoid. In cases of diphtheria, we used antitoxin with good results.—Dr. A. M. Peables, Sec.

AURORA. 1901. No cases of diphtheria, scarlet fever, or typhoid fever.—Chas. P. Silsby, Sec.

AVON. 1900. No contagious diseases reported.—Fred Morton, Sec.

1901. One case of scarlet fever.—George T. Jacobs, Sec.

BAILEYVILLE. We have been blest with good health so that our board has had nothing to do for the past two years.—Michael Maloy, Sec.

BALDWIN. 1900. One nuisance removed. One case of scarlet fever, and one of typhoid.

1901. Five nuisances reported and four removed. No infectious diseases except three cases of diphtheria, in which antitoxin was used with good results.—Ambrose Spencer, Sec.

BANCROFT. The removal of one nuisance in 1901 was all the work which the board had to do during the two years.—Thos. Fitzpatrick, Sec.

BANGOR.—1900. Ninety nuisances reported and removed. Five cases diphtheria, thirty-eight of scarlet fever, and fifty of typhoid. We have constructed 3,339 feet of new sewers, and have improved the sanitary condition of our city very much by doing away with a good many privies and earth-closets and putting in a large number of water-closets connecting with the sewers.

1901. One hundred and twenty-five nuisances reported, all of which have been removed or discontinued. Nineteen cases of smallpox, four of diphtheria, seven of scarlet fever, and seventy of typhoid fever. Antitoxin was used with good results in the cases of diphtheria. In this disease, and also in scarlet fever, we disinfect with formaldehyde, using Professor Robinson's disinfecting lamp. When we have cases of pulmonary tuberculosis, we advise the burning of the sputum. We have done more work this year than any previous one since the board was organized in 1887.—John Goldthwait, Sec.

BARING. 1900. Ten cases of scarlet fever.—Joseph Stevens, Sec.

1901. One nuisance reported which was removed at once. One case typhoid fever.—S. P. Polleys, Sec.

BATH. 1900. Five nuisances reported and four removed. Two cases of diphtheria, fifteen of scarlet fever, and two of typhoid.

1901. Nine nuisances reported, six of which were removed. Three cases of smallpox, nine of diphtheria, two of scarlet fever, and six of typhoid fever. In three cases of diphtheria, antitoxin was used with fine results.—Dr. E. J. Marston, H. O.

BEDDINGTON. One case of typhoid fever was reported in 1900, and two or three cases of whooping-cough in 1901, but no other contagious diseases in either year.—A. F. Libby, Sec.

BELFAST. 1900. Six nuisances reported; four removed. Twelve cases of scarlet fever, and two of typhoid.

1901. This year eleven nuisances were reported, eight of which were removed. Two cases of diphtheria, none of scarlet fever, and one of typhoid.—E. L. Stevens, Sec.

BELGRADE. 1901. We have had no cases of contagious disease.—James Tebbetts, Sec.

BELMONT. We have had no contagious diseases for the past two years, so no work has been required of the board.—C. R. Andrews, Sec.

BENEDICTA. 1901. Three nuisances reported but none removed. Three cases of scarlet fever.—James Duffy, Chr.

BENTON. Two cases of typhoid fever in 1901 are all the infectious diseases reported to the board in either year.—A. L. Plummer, Sec.

BERWICK. 1900. Three nuisances removed. One case of scarlet fever and two of typhoid.

1901. One nuisance removed. Two cases of scarlet fever and one of typhoid.—Dr. J. E. Lord, H. O.

BETHEL. 1900. Two nuisances reported; one removed. Four cases of typhoid fever.

1901. No infectious diseases reported. During the past season a sewer has been constructed throughout the length of our principal street which must necessarily improve the sanitary conditions by enabling closets to be put into the business and dwelling houses. We think the people are realizing the necessity of better sanitary precautions and are keeping things in better condition than heretofore.—E. C. Park, Sec.

BIDDEFORD. 1900. One hundred and eight nuisances reported, ninety-two of which were removed. Eight cases of diphtheria, six of scarlet fever, and thirty-six of typhoid. Formaldehyde disinfection was used in scarlet fever and diphtheria cases. We have attended to our duties in the same general way that has been done in the past few years. We have tried to keep the city clean, but the population and imperfect sewerage is such, that it is a wonder there has not been more sickness. We regard the dumping of waste near the residential part of the city a menace to health. In our judgment, this waste should be burned.—Edward L. Cowan, Sec.

1901. Thirty-eight nuisances reported; thirty-one removed, or in process of removal. Two cases of smallpox, two of diphtheria, seven of scarlet fever, and nine of typhoid fever. A large sewer is now being constructed, which, when finished, will abate several formidable nuisances along its course. It will not be completed until next year as it involves a great deal of work and expense.—Dr. John Lord, H. O.

BINGHAM. 1900. One nuisance reported, but not removed. Two cases of scarlet fever. No public or private improvements within the past year. The great need of the village is a system of sewers.

1901. One nuisance removed. Eleven cases of scarlet fever in five houses. Whenever there have been cases of pulmonary tuberculosis, we have warned the families of the danger of contagion, and supplied them with circulars furnished by the State board of health. Formaldehyde disinfection has been very generally used.—T. F. Houghton, Sec.

BLAINE. 1900. Nothing in the way of infectious diseases this year, and no nuisances reported. We have improved the

sanitary conditions in our village and town during the past three or four years and we have certainly seen the benefits derived, by the quite general absence of cases of infectious diseases. There are two villages in the town, Blaine and Robinson, and we generally have one member of the board of health in each village and a third in one of the rural districts somewhere in the town; in this way every section of the town is quite carefully looked after. The matter of vaccination has not been properly attended to; none having been vaccinated for several years so far as I can learn.—R. W. Bell, Sec.

1901. No nuisances reported. Five cases of scarlet fever and two of typhoid.—Dr. A. J. Fulton, H. O.

BLANCHARD. No nuisances reported in either year. In 1900, we had five cases of scarlet fever and one of typhoid. In cases of scarlet fever, formaldehyde disinfection was used.—E. P. Blanchard, Sec.

BLUEHILL. 1900. Two cases of scarlet fever and three of typhoid.

1901. One nuisance removed. Two cases of scarlet fever and four of typhoid fever. In cases of consumption, precautions have been taken to prevent contagion. We have advised the patients to use spit-cups containing a disinfecting solution.—Dr. R. P. Grindle, Sec.

BOOTHBAY. 1900. Three nuisances removed. No contagious diseases with the exception of four cases of diphtheria in which antitoxin was used freely with good results.

1901. Two nuisances reported and removed. No infectious diseases.—Byron Giles, Sec.

BOOTHBAY HARBOR. 1900. Seven nuisances reported, five of which were removed. Five cases of typhoid fever, but no more infectious diseases. Many improvements in the way of private sewerage systems have been made.

1901. Six nuisances removed. One case of diphtheria, one of scarlet fever, and three of typhoid. We used antitoxin with good results in the case of diphtheria. By our direction some 400 feet of sewer pipe leading to the shore of the harbor have been put in.—A. P. Wylie, Sec.

BOWDOIN.—No cases of infectious diseases in either year except three of scarlet fever in 1901 in which formaldehyde disinfection was used.—W. B. Chase, Sec.

BOWDOINHAM. 1900. Four cases of typhoid fever, but none of diphtheria or scarlet fever.—Lewis M. Foulton, Sec.

BOWERBANK PLANTATION. One case of scarlet fever in each year, but no other contagious diseases.—B. L. Glover, Sec.

BRADFORD. No nuisances reported in either year. In 1900, we had twelve cases of scarlet fever and two of typhoid.—L. W. Coy, Sec.

BRADLEY. Two cases of typhoid fever in 1901 are all the infectious diseases we have to report for the two years.—Geo. W. Reed, Sec.

BREMEN. No cases of diphtheria, scarlet fever, or typhoid fever for the last two years.—W. B. Hilton, Sec.

BREWER. 1901. Five nuisances reported; all have been removed or surroundings greatly improved. Two cases of diphtheria and fifty of typhoid fever. A thorough vaccination was made of school children and many adults.—W. H. Gardner, Sec.

BRIDGEWATER. 1900. One nuisance reported and removed. No contagious diseases.—Percy Sargent, Sec.

1901. Two nuisances removed. Our town has been remarkably free from sickness this year. Scarlet fever was reported in one family, and we had three cases of typhoid fever. I am satisfied from inquiries made of the doctors and families where these diseases occurred that the houses, bedding, and clothing were properly disinfected.—Asa H. Bradstreet, Sec.

BRIDGTON. 1900. Two nuisances removed. Twenty-seven cases of scarlet fever, four of typhoid, three hundred and forty-nine of measles, sixty-eight of whooping-cough, and one each of pulmonary tuberculosis, membranous croup, and typhoid pneumonia have been reported.

1901. Two nuisances removed. Nine cases of whooping-cough, one of tuberculosis, one of diphtheria, six of scarlet fever, two of typhoid fever, and five of measles. Disinfection was done by steam, carbolic acid, or formaldehyde.—I. S. Webb, Sec.

BRIGHTON PLANTATION. 1900. We have not made any improvements, either public or private, for the last year. Most of the village is supplied with water from good springs. We have had no contagious diseases reported.—J. C. Adams, Sec.

1901. Three cases of scarlet fever, but none of diphtheria or typhoid fever.—J. S. Nason, Sec.

BRISTOL. 1900. Six nuisances removed. One case of diphtheria and one of typhoid fever. We had an outbreak of measles, one hundred and fifty cases, but no fatalities known. One case of glanders in horse and two of tuberculosis in cows. These were visited by the Cattle Commissioners, and after being appraised, were ordered killed and the stables disinfected, in two cases with formaldehyde, and one with corrosive sublimate.

1901. Two nuisances reported and one removed. Five cases of diphtheria, two of scarlet fever, and one of typhoid fever. Antitoxin was used freely in the diphtheria cases with good results. It has been reported to us, that there are physicians from other states, who come here for their vacation and respond to calls. This not only interfered with our local doctors, but makes a danger from contagious troubles, as these physicians do not dare to report because they have no licenses.—George E. Little, Sec.

BROOKLIN. 1900. There have been no outbreaks of any contagious diseases except one case of scarlet fever. No improvements have been made or undertaken.

1901. Ten cases of scarlet fever and one of typhoid. The scarlet fever cases appeared in three different families, and neither of them connected in any way with the others, nor have we been able to find the source of contagion in either case. We think it must have been brought in from out of town in some way unknown to us. In cases of consumption, we advised that the sputum be received in paper boxes and burned, the rooms being thoroughly cleansed afterward.—E. P. Cole, Sec.

BROOKS. No nuisances reported in either year. No cases of contagious diseases except two of typhoid fever in 1900.—Dr. N. R. Cook, H. O.

BROOKSVILLE. 1900. Our secretary having removed, we are unable to make a full report, but so far as we can learn there have been no contagious diseases with the exception of two cases of typhoid fever.—W. C. Bates, Chr.

1901. An epidemic of whooping-cough, very fatal to infants, resulted in closing a number of schools. This has been a very healthy town in regard to other infectious diseases.—Dr. Franklin Farrow, Sec.

BROOKTON. No infectious diseases in either year.—A. O. Fish, Sec.

BROWNFIELD. 1900. Four cases of scarlet fever, but no cases of diphtheria or typhoid.—H. F. Fitch, Sec.

BROWNVILLE. 1900. Twelve nuisances reported; all have been taken care of. Twenty-five cases of scarlet fever and three of typhoid. We disinfected with formaldehyde, using Professor Robinson's lamp.

A small brook running through Henderson has given us some trouble as the alder bushes stopped the current, rendering it offensive, and, the physicians say, a cause of sickness. We have put in a ditch and have it in good condition now.

1901. Six nuisances were reported; all have been removed. Six or more cases of scarlet fever. No special work has been done this year.—T. W. Pratt, Sec.

BRUNSWICK. 1900. Fourteen nuisances removed. Fifteen cases of diphtheria, thirty-three of scarlet fever, and two of typhoid.

1901. Twelve nuisances reported and removed. Seventeen cases of diphtheria, twenty-seven of scarlet fever, and two of typhoid fever. Both years, antitoxin was used in all but very mild cases of diphtheria with invariably good results. In this disease, as well as in scarlet fever, disinfection was done by steam, boiling, and formaldehyde.—Dr. Chas. H. Cumston, Sec.

BUCKFIELD. 1900. The only contagious diseases we have had during the past year are confined to a few cases each of whooping-cough and measles. One so-called nuisance was reported and that if found to be a nuisance the parties promised to remove. While we have been very fortunate in having very little disease, I feel that as a town grows older, there is great need of a better sewerage system. I also find that some physicians are less strict in measures to prevent the spread of contagious diseases than they ought to be, and do not coöperate with the board as it seems to me they should.—Arthur E. Cole, Sec.

1901. One nuisance reported and promptly removed by notice from board. Five cases of diphtheria and one of scarlet fever. Antitoxin was used in each case of diphtheria. All recovered.—Merritt Parsons, Chr.

BUCKSPORT. 1900. Three nuisances removed. Five cases of scarlet fever and three of typhoid. Have endeavored to construct sewers of which we are in need.—F. W. Smith, Sec.

1901. Seven nuisances reported and six removed. One case each of diphtheria and typhoid fever, but none of scarlet fever.—Dr. H. E. Snow, H. O.

BURLINGTON. 1900. We have had eight cases of measles in town and five of scarlet fever.

1901. One case of diphtheria and one of measles, but no other infectious diseases.—Chas. Barker, Sec.

BURNHAM. 1900. One nuisance reported. One case of scarlet fever, none of diphtheria or typhoid.

1901. One nuisance removed. Two cases of scarlet fever and one of typhoid.—F. A. McAllister, Sec.

BUXTON. 1900. Two nuisances removed. Five cases of diphtheria, eight of scarlet fever, and four of typhoid fever. Antitoxin was used in all cases of diphtheria with excellent results. The town purchased during the year a formaldehyde generator which has been a great help in disinfecting. Where there has been scarlet fever or diphtheria, we have tried to have infected room, after disinfection, painted, ceiling whitewashed, and wall papered.—Dr. A. H. Weeks, Sec.

1901. Two nuisances reported and removed. No cases of diphtheria, or scarlet fever, but one of typhoid.—Dr. V. C. Totman, H. O.

BYRON. One mild case of diphtheria in 1900 was the only infectious disease during the two years.—H. H. Richards, Sec.

CALAIS. 1900. Ten nuisances removed. Six cases of diphtheria, twelve of scarlet fever, and six of typhoid. Formaldehyde disinfection was used. The only important improvement that occurs to me is, that in conjunction with the school board, we have established a system of compulsory vaccination in the public schools. We require every pupil to obtain from some reputable physician a certificate of successful vaccination, or a certificate from two physicians, of physical unfitness for vaccination.—Dr. J. R. N. Smith, Sec.

1901. Six nuisances reported; all have been removed. Two cases of diphtheria, three of scarlet fever, and five of typhoid fever. Antitoxin was used in all the cases of diphtheria in both years, resulting in recovery. This report is very unsatisfactory, but it is the best I can make with the information at my command.—Dr. W. S. McKellar, Sec.

CAMBRIDGE. 1900. This has been a very healthy year for this town. Nothing to note except its epidemic of measles in the winter and spring when we had thirty cases.—Dr. J. H. Wilson, Sec.

1901. This year has been an unusually quiet one for the board on account of the good health and natural sanitary conditions of the town. We offered free vaccination twice during the year, March 4 to 16, and May 31 to June 12. About twenty-five were vaccinated. Eight cases of measles were reported, but no other infectious disease.—F. J. Hersey, Sec.

CAMDEN. 1900. Fourteen nuisances reported; nearly all removed. Six cases of diphtheria, five of typhoid fever, but none of scarlet fever. The cases of diphtheria were confined to two families who had recently moved here. We have no doubt that they contracted the disease before coming here. We used antitoxin with the best results, and, after recovery, disinfected with formaldehyde, steam, and boiling.

1901. Thirteen nuisances reported to the board and nearly all removed. We had four cases of diphtheria, all in very light form, and four of typhoid fever. In cases of diphtheria, antitoxin was used early with excellent results. There was also one fatal case of membranous croup and one death from consumption.—A. Buchanan, Sec.

CANAAN. 1900. Two nuisances removed. Two cases of diphtheria, six of scarlet fever, but none of typhoid.

1901. Two nuisances reported and removed. Three cases of diphtheria, four of scarlet fever, and two of typhoid fever.—Dr. L. W. Shean, Sec.

CANTON. 1900. Five or six cases of diphtheria in a light form, five of scarlet fever, and six of typhoid.

1901. Three cases of diphtheria, one of scarlet fever, and three of typhoid fever.—R. A. Barrows, Sec.

CAPE ELIZABETH. 1900. Four nuisances removed. One case of typhoid fever, but none of diphtheria or scarlet fever.

1901. One nuisance reported and removed. One case of diphtheria in which antitoxin was used with good results. Formaldehyde was used for disinfecting.—Edward F. Hill, Sec.

CARATUNK PLANTATION. 1900. One nuisance removed. No infectious diseases reported.—C. L. Witham, Sec.

1901. No contagious diseases reported for this year except one case of scarlet fever.—Ernest Sterling, Sec.

CARIBOU. 1900. Six nuisances reported; four removed. One case of diphtheria, three of scarlet fever, and eight of typhoid. In the above case of diphtheria, antitoxin was used with the best of results. Every spring as soon as the snow has left us and frost is out of the ground, we make an inspection of all the buildings in the village proper—look after the privies, sink-drain, and the natural and unnatural accumulation during the winter. If these matters have not been attended to, we notify the owner personally and are generally cordially received. The sanitary conditions of High street are bad, but this board, the same as its predecessor, is at a loss to know how to remedy it without a sewerage system.

1901. Five nuisances removed. One case of diphtheria, one of scarlet fever, and five of typhoid fever.—Dr. W. E. Sincock, Sec.

CARMEL. No nuisances reported except one in 1900 which was removed. We had no infectious diseases reported to the board except two cases of scarlet fever in 1900.—F. A. Simpson, Sec.

CARROLL. We have had nothing to do during the past two years. A constant watch is kept by the board, and if cases of infectious diseases should be reported, they will be dealt with as the health laws direct. I think this town one of the most healthy localities in this State.—Hiram Stevens, Sec.

CARTHAGE. 1900. No infectious diseases except one case of typhoid fever and six of measles. No nuisances reported.

1901. Two cases of typhoid fever were the only contagious diseases reported to the board.—C. F. Eaton, Sec.

CARY PLANTATION. No contagious diseases reported for either year.—David A. Moore, Sec.

CASCO. 1900. Three nuisances reported; all were removed. Ten cases of typhoid fever in three houses.

1901. Three nuisances removed. No infectious diseases reported to the board.—Dr. Walter Corliss, H. O.

CASTINE. 1900. Four nuisances reported and removed. No cases of diphtheria, scarlet fever, or typhoid fever reported. In cases of pulmonary tuberculosis, the family was warned of the nature of the disease, and request made to isolate as far as possible. Our latest public improvement is a six-inch sewer that connects with all the schoolhouses and empties into the river at low water mark.

1901. Four nuisances removed. One case of diphtheria, but no other infectious disease except an epidemic of whooping-cough this fall and winter.—Dr. S. J. Wallace, Sec.

CASTLE HILL PLANTATION. 1900. No nuisances reported. Three cases of typhoid fever, but none of diphtheria or scarlet fever.—F. C. Dudley, Sec.

1901. Four nuisances reported and removed. Six cases of typhoid fever.—Dr. Chas. E. Dow, H. O.

CASWELL PLANTATION. 1900. One nuisance removed. No infectious diseases reported during the year.—Johnson Caldwell, Sec.

1901. No infectious diseases except four cases of typhoid fever which proved to be very light.—Edward Girrard, Sec.

CENTERVILLE. 1900. I cannot report anything but a clean bill of health.—Chas. W. Caler, Sec.

1901. Had no contagious diseases in the year. Town in good condition.—Henry F. Foster, Sec.

CHAPMAN. 1901. No infectious diseases reported during the year.—E. C. McLaughlin, Sec.

CHARLESTON. 1900. No nuisances reported. One case of diphtheria, eleven of scarlet fever, but none of typhoid fever. Formaldehyde was used as a disinfectant. When cases of pulmonary tuberculosis occur, circulars on consumption are given and orders to follow their instructions. We endeavor to be progressive and utilize all necessary means as advised by the State board to avoid contagion. We have come to the conclusion that the scarlet fever was brought from Levant through a case who had it so light that it was regarded as measles and treated with the knowledge of a physician. The cases having it frequented the house as neighbors and students with the consequent results. Only one death from a malignant form.

1901. Seven cases of typhoid fever, but no other infectious disease. The cases of typhoid fever were confined mostly to one family. It is suspected that the cause was polluted well water. A sample of it has been sent to the State chemist for analysis.—Dr. G. B. Noyes, H. O.

CHARLOTTE. 1900. I am glad to inform you that we have not had any cases of contagious diseases in this town for the past year.—J. F. Mahar, Sec.

1901. No nuisances reported. No cases of diphtheria, scarlet fever, or typhoid fever reported to the board.—F. J. Sprague, Sec.

CHELSEA. 1900. No nuisances reported. Four cases of scarlet fever, but none of diphtheria or typhoid fever. In cases of scarlet fever, formaldehyde disinfection was used.—W. T. Searls, Sec.

1901. No cases of infectious diseases except one of diphtheria.—J. S. Tenney, Sec.

CERRYFIELD. 1900. No contagious diseases reported to the board. In cases of consumption, patients were informed of the possibility of infection from the sputum and advised to use vessels containing a little carbolic acid in solution, and also soft cloths to be immediately burned.—Dr. W. A. Van Wart, Sec.

CHESTER. 1900. One case of scarlet fever and one of typhoid. Upon the whole it has been a general time of good health throughout the town the past year. One case of consumption was also reported.

1901. No nuisances reported during the year. No infectious diseases.—J. D. Kyle, Sec.

CHESTERVILLE. 1900. No nuisances reported. Two cases of diphtheria in which antitoxin was used with good results, were the only infectious diseases reported for the year.—S. T. Grant, Sec.

CHINA. 1900. Two nuisances reported one of which was removed. Twenty-four cases of diphtheria, one of scarlet fever, and two of typhoid fever. In cases of diphtheria, antitoxin was used with most excellent success. None of our cases proved fatal where it was used in the first stages of the disease. Disinfecting was done by boiling and formaldehyde.—Dr. G. J. Nelson, Sec.

1901. No nuisances reported to the board. One case of scarlet fever and five of typhoid.—Dr. C. J. Lincoln, Sec.

CLIFTON. 1900. No nuisances reported. No cases of infectious disease.—W. H. Parks, Sec.

1901. There has not been a case of contagious disease of any kind in our town during the past year.—F. W. Bowden, Sec.

CLINTON. 1900. Six nuisances reported; all of them removed. There were three cases of typhoid fever, also twenty cases of measles and about the same of whooping-cough. We

have made some improvements on Twelve Mile stream by blowing out the ledge and giving the water a free run to carry off the waste.

1901. No nuisances reported. Two cases of diphtheria, one of scarlet fever, and two of typhoid. There were eleven cases of measles reported also.—J. W. Waldron, Sec.

CODYVILLE PLANTATION. 1900. No infectious diseases reported during the year.—Thomas O. Hill, Sec.

1901. We have had no contagious diseases and no work to do in that capacity.—Hiram Cochrane, Sec.

COLUMBIA. No nuisances reported for either year. We have had no infectious diseases during either year except a number of cases of measles in 1900. They were very light. One school was closed for a few weeks on account of them.—John E. Stewart, Sec.

COLUMBIA FALLS. No nuisances were reported to the board during either year. Five cases of scarlet fever in 1900 and one of typhoid in 1901 were the only infectious diseases in either year.—G. L. Bucknam, Sec.

CONCORD. No contagious diseases in either year.—Wm. Littlefield, Sec.

COOPER. No nuisances in either year. No cases of diphtheria or scarlet fever, but one of typhoid fever in 1901.—Willis G. Day, Sec.

COPLIN PLANTATION. No contagious diseases in the plantation the past two years.—F. T. Blackwell, Sec.

CORINTH. 1900. One nuisance removed. One case of scarlet fever, one of typhoid, but no other infectious disease. In case of scarlet fever, formaldehyde was used for disinfecting.—F. H. Skinner, Sec.

1901. One nuisance reported and removed. One case of typhoid fever, but none of diphtheria or scarlet fever.—W. E. Jordan, Sec.

CORNISH. 1900. Nothing has been reported to the board of health during the year past. We have been very free from contagious diseases. Measles and whooping-cough have been quite prevalent, but no bad results have been noticed from either of them. We have not had any typhoid fever for a long time.—Howard Brackett, Sec.

1901. No nuisances reported to the board. Nineteen cases of scarlet fever and two of typhoid. In cases of consumption, we have advised the fumigation of rooms with formaldehyde.—Dr. Geo. W. Weeks, H. O.

CORNVILLE. 1900. One mild case of scarlet fever and several cases of measles were the only infectious diseases reported to the board. One case of measles proved fatal, a lady with rather weak lungs.—S. S. Woodman, Sec.

1901. No infectious diseases reported.—W. H. Morrill, Sec.

CRANBERRY ISLES. 1900. No cases of diphtheria, scarlet fever, or typhoid fever reported.

1901. With the exception of one case of typhoid and one case of scarlet fever in a mild form, we have been free from any infectious diseases. The past year has been a very healthy one in this town.—Geo. W. Bulger, Sec.

CRAWFORD. The past two years have been very healthy, there being only two cases of measles and one of tuberculosis reported to the board. We have been in readiness to take action if required.—J. P. Jeffery, Sec.

CRIEHAVEN. 1900. No nuisances reported to the board. We look after the cellar drains, sink pipes, and outhouses carefully each year. We have had no contagious diseases during the past year but, should any occur, we shall go by the directions of the State board of health.—E. W. Crie, Sec.

1901. No infectious diseases reported for the year.—H. J. McClure, Sec.

CRYSTAL PLANTATION. 1900. There have not been any contagious diseases reported.—W. C. Hackett, Sec.

CUMBERLAND. 1900. Six nuisances removed. Five cases of scarlet fever and one of diphtheria, but none of typhoid fever. Antitoxin was used in the case of diphtheria with good results.

1901. No nuisances reported to the board. There were three cases of scarlet fever in which formaldehyde disinfection was used after recovery.—Dr. H. M. Moulton, H. O.

CUSHING. No infectious diseases reported during the past two years except one case of typhoid fever in 1901.—A. R. Rivers, Sec.

CUTLER. 1900. No cases of contagious disease except two of scarlet fever.

1901. No nuisances reported. We are a seaboard town, have good drainage, and people in general take an interest in doing

all that is possible for the sanitary condition of the town.—F. S. Stevens, Sec.

CYR PLANTATION. 1900. No nuisances reported. No infectious diseases during the year.—Eli Ouellet, Sec.

DALLAS PLANTATION. No infectious diseases reported for either year.—Mrs. Ella G. Adams, Sec.

DAMARISCOTTA. 1900. Two nuisances removed. One case of diphtheria and one of typhoid, but none of scarlet fever. The one great need of this village now is a sewer through the main street. The sewer would be short, straight and the expense light. The street is to grade and includes essentially all the business portions of the village.

1901. There have been no infectious diseases during the year. There has been nothing done this year by way of sanitary improvements.—A. H. Snow, Sec.

DANFORTH. No nuisances reported except four in 1901, all of which were removed. Three cases of scarlet fever and four of typhoid in 1901 were the only infectious diseases during the two years.—Dr. M. L. Porter, Sec.

DAYTON. 1900. The only epidemics that have visited us during the last year were measles and influenza. There were many cases of measles among adults as well as children. I am sure that had the first patients been quarantined and a moderate degree of care taken, many would have escaped the disease and much trouble avoided. There have also been a few cases of pneumonia and tonsilitis. I think all cases of "sore throat" should be isolated for a while until the true value of the malady is determined.

1901. Again this year we have been quite free from infectious diseases, none having been reported to this board. We have made no public improvements the past year. I think however that in private families some considerable improvements have been made in the line of sanitary reform. Pure water and better drainage are among the foremost in this direction. We have made suggestions where we thought appropriate and they have been well received. They begin to appreciate the fact that with a little well directed effort, much trouble can be avoided and are governing themselves accordingly. In country towns like this, each family must be a law unto itself in this direction and I think the people are getting to understand where the responsibility

rests and are making progress all along the line of sanitary reform.—Dr. Geo. Sylvester, H. O.

DEAD RIVER PLANTATION. 1900. No infectious diseases reported to the board. There have been no changes, nor no occasion for any.—S. A. Parsons, Chr.

1901. There has not been a case of sickness in the plantation for the past year.—B. F. Safford, Sec.

DEBLOIS. 1900. We have had no cases of contagious diseases for the past year.—Wm. B. Leighton, Sec.

1901. No nuisances reported to the board. No infectious diseases.—A. H. Wilson, Sec.

DEDHAM. There were three nuisances removed in 1901 and one in 1900. No infectious diseases in either year except one case of typhoid fever in 1900.—C. J. Lamber, Sec.

DEER ISLE. 1900. Five cases of diphtheria, two of typhoid fever, and one of consumption were the only infectious diseases reported to the board. In one case of diphtheria antitoxin was administered, but too late and the patient died.

1901. One nuisance removed. Four cases of typhoid fever. No improvements have been made during the past year.—Geo. W. Small, Sec.

DENMARK. 1900. There has been but very little work for the board during the past year. With the exception of whooping-cough and a few cases of measles, there have been no infectious diseases in town. Two nuisances were reported, but were removed without any trouble.

1901. We have had but one case of contagious disease for the past year, that being a case of scarlet fever, with the exception of tuberculosis. There have been four cases of that, three being in one family. We have used every means known to us to prevent the spread of this disease. The patients were kept away from other people as much as possible.—Dr. S. T. Brown, Sec.

DENNISTOWN PLANTATION. Nothing reported for either year.—Joseph Henderson, Chr.

DENNYSVILLE. No infectious diseases reported during either year except a number of cases of measles in 1900.—Fred L. Gardner, Sec.

DETROIT. 1900. No nuisances reported. One case of typhoid fever, but none of diphtheria or scarlet fever. We have

carefully investigated the town at times to see that no nuisances are tolerated.

1901. Three nuisances removed. Three cases of typhoid fever.—L. W. Clark, Sec.

DEXTER. 1900. Five nuisances reported and removed. Three cases of scarlet fever and four of typhoid, but none of diphtheria. In cases of scarlet fever and diphtheria, formaldehyde disinfection was used.

1901. Three nuisances removed. Six cases of smallpox, two of scarlet fever, and two of typhoid.—Edgar A. Russ, Sec.

DIXFIELD. 1900. One fatal case of membranous croup in which antitoxin was used in the last stages, two of scarlet fever, and one of typhoid fever. We could not locate the origin of the first case of scarlet fever, but the boy, sixteen years of age, thought it might be from a pair of ready-made pants which he had worn but a short time previous to the sickness.

1901. No contagious disease reported to the board except three cases of typhoid fever.—Dr. J. S. Sturtevant, Sec.

DIXMONT. 1900. No nuisances reported. Three cases of scarlet fever were the only infectious diseases during the year. When cases of consumption occur, the family is informed of the infectious nature of the disease and advised as to care of patient's person and clothing.—Dr. E. E. Brown, H. O.

1901. One case of scarlet fever.—A. F. Tasker, Sec.

DOVER. 1900. Two nuisances removed. One case of diphtheria, forty-eight of scarlet fever, and one of typhoid. No public or private improvements.—Geo. G. Downing, Sec.

DRESDEN. We have had no infectious diseases during the two years except two cases of typhoid fever in 1900 and three of scarlet fever in 1901.—Dr. L. H. Dorr, H. O.

DREW PLANTATION. No contagious diseases reported in either year.—Charles R. Andrews, Sec.

DURHAM. 1901. Four cases of diphtheria, but none of typhoid or scarlet fever.—S. B. Libby, Sec.

DYER BROOK. No infectious diseases reported to the board during the past two years except two cases of scarlet fever in 1900.—L. S. Townsend, Sec.

E PLANTATION. 1900. No nuisances reported. No contagious diseases.—Sylvanus Rideout, Sec.

1901. Nothing reported except one case of typhoid fever and one death from consumption.—G. H. Kingsbury, Sec.

EAGLE LAKE PLANTATION. 1900. We have not been called to any case of infectious disease during the year.—John M. Brown, Sec.

EASTBROOK. No cases of contagious diseases reported during the two years. S. S. Butler, Sec.

EAST LIVERMORE. 1900. Five nuisances reported, and if not removed, have been remedied as far as possible. Two cases of diphtheria and one of typhoid fever. In cases of diphtheria, antitoxin was used. One died and one recovered.

1901. Six nuisances removed. Two cases of typhoid fever.—Dr. C. H. Gibbs, Sec.

EAST MACHIAS. 1901. Twenty-five nuisances reported, but only twenty removed. One case of diphtheria in which antitoxin was used with perfect success.—E. E. Wiswell, Sec.

EASTPORT. 1900. Twenty-seven nuisances reported; all removed. One case of diphtheria and six of typhoid fever. In cases of consumption, the attending physicians looked after them by direction of the board of health.

1901. Fifty-five nuisances removed. Twenty-eight cases of scarlet fever in twelve houses, and nine of typhoid fever. Formaldehyde was used for disinfecting.—John A. Lowe, Sec.

EDDINGTON. Two nuisances reported and removed in 1901 were the only ones reported for the two years. One case of diphtheria in 1900 and four of typhoid fever in 1901 were all the infectious diseases during the two years.—Geo. W. Estes, Sec.

EDEN. 1900. A good many nuisances have been reported, some trivial, but all are thoroughly investigated by the board. One case of diphtheria, forty-one of scarlet fever, and one of typhoid.—S. J. Clement, Sec.

1901. One hundred nuisances reported; about eighty have been removed. One case of diphtheria, ten of scarlet fever, and four of typhoid fever. Antitoxin was used in the one case of diphtheria with good results. We are trying to take measures for cremating garbage, offal, etc., and have asked the assistance of the municipal officers in regard to it.—F. Loring Foster, Sec.

EDGEComb. I have but little to say in my report as, with the exception of two cases of typhoid fever in 1900, we have been entirely free from contagious diseases during the two years. One nuisance was reported in 1901. Each member of the board has his particular section of the town to look after so we are

ready to act promptly should occasion arise.—Frank M. Dodge, Sec.

EDINBURG. We have had no infectious diseases reported to the board during the past two years.—C. W. Eldredge, Sec.

EDMUNDS. 1900. No nuisances reported. No contagious diseases reported.—Chas. E. Hayward, Sec.

1901. One case of typhoid, but none of diphtheria or scarlet fever.—Leveston Jones, Sec.

ELIOT. 1900. Three cases of scarlet fever. Very little work has come within the province of the board during the past year. Whooping-cough and chickenpox have been generally prevalent among the children.

1901. No nuisances reported. Twenty cases of scarlet fever in nine houses and one of typhoid, but none of diphtheria. This has been a very uneventful year with us except as above noted.—Dr. H. I. Durgin, Sec.

ELLIOTTSVILLE PLANTATION. We have had nothing to do for the past two years. There has been no sickness in the plantation of any kind during the two years.—H. W. Lane, Sec.

ELLSWORTH. 1900. Fourteen nuisances reported, nine of which were removed. Sixteen cases of scarlet fever and nine of typhoid. In cases of scarlet fever, formaldehyde disinfection was used.

1901. Four nuisances removed. No contagious diseases reported except twenty cases of scarlet fever.—Dr. J. F. McDonald, Sec.

EMBDEN. 1901. Nothing reported for the year.—F. B. Young, Sec.

ENFIELD. 1901. One nuisance removed. Two cases of typhoid fever, but no other infectious diseases.—S. W. Bragg, Sec.

ETNA. 1900. One case of typhoid fever. Measles were reported in the high school and from seventy-five to one hundred cases have developed.—O. W. Cole, Sec.

1901. Six cases of scarlet fever and two of typhoid. The six cases of scarlet fever were in one school and were badly scattered before anything was done. There was only one death from this disease.—S. J. Locke, Sec.

EUSTIS. Five cases of diphtheria in 1900 and two of scarlet fever and one of typhoid in 1901 were the only infectious dis-

eases during the two years. In cases of diphtheria, antitoxin was used with good results.—F. L. Gordon, Sec.

EXETER. 1901. Three cases of typhoid fever, but no other contagious disease reported.—Dr. S. J. Redman, Sec.

FAIRFIELD. 1900. Fifteen nuisances reported to the board; all removed except one that is out of our hands and is in litigation. One case of scarlet fever. Also one case of consumption in which the house was thoroughly disinfected with formaldehyde.

1901. About twenty-five nuisances reported and removed. Twenty cases of scarlet fever and about ten of typhoid fever.—Geo. C. Eaton, Sec.

FALMOUTH. 1901. No cases of infectious diseases reported to the board.—D. W. Lunt, Sec.

FARMINGDALE. 1901. Nothing reported during the year.—D. W. Pillsbury, Sec.

FARMINGTON. 1900. Three nuisances removed. Four cases of diphtheria, one of scarlet fever, and three of typhoid. Antitoxin was used in cases of diphtheria with good results. All houses in which there have been contagious diseases should be strictly quarantined until all danger from infection is passed. We have had more trouble in this respect than any other. The sewerage has been improved in a great many instances. Every town should have a system of sewerage.

1901. Five nuisances removed. Four cases of diphtheria, one of scarlet fever, and one of typhoid. In every case of diphtheria, antitoxin was used with good results.—Dr. F. O. Lyford, H. O.

FAYETTE. There has not been much work for the board during the last two years, there having been only one nuisance removed in 1900 and one case of typhoid fever reported in 1901.—O. L. Basford, Sec.

FLAGSTAFF PLANTATION. 1900. There was nothing to report for this year.—Warren Wing, Sec.

1901. One case of scarlet fever, but none of typhoid or diphtheria. Formaldehyde disinfection was used.—David A. Butler, Sec.

FOREST CITY. 1900. No infectious diseases during the year.—A. S. Robinson, Sec.

1901. No nuisances reported. Six cases of scarlet fever.—A. F. Dunphy, Sec.

FORT FAIRFIELD. Nothing reported for the two years except two nuisances removed in 1900; also forty cases of diphtheria and two of scarlet fever in 1901.—Dr. Robert H. Perkins, Sec.

FORT KENT. Three nuisances removed in 1900 and four in 1901. There were no infectious diseases in either year with the exception of four cases of diphtheria and one of typhoid in 1900. In cases of diphtheria, antitoxin was used with the best of results.—Dr. Felix G. Serois, H. O.

FOXCROFT. 1900. Three nuisances removed. One case of scarlet fever and one of typhoid were the only contagious diseases. For the case of scarlet fever, we used formaldehyde and steam for disinfecting. In the summer we had the people of the town clean up the premises where it needed it, and keep them so. We have a good system of water. We have only a small amount of sewer which makes it bad in some cases where there is so much waste water running.

1901. Five nuisances removed. Two cases of diphtheria and one of scarlet fever. Antitoxin was used with good results in cases of diphtheria.—Geo. W. Ham, Sec.

FRANKFORT. 1900. Two nuisances removed. There have been no cases of scarlet fever or diphtheria, but we have had a form of ulcerated sore throat in this vicinity that very closely resembles the latter disease. We have had quite an epidemic of typhoid fever, fifteen cases in all, but they were not reported to the board by the attending physicians. The board has tried to keep the village in a tolerably healthy condition, but without the coöperation of the physicians it has been up-hill work.—Dr. O. S. Erskine, H. O.

1901. Three nuisances reported and removed. We have been very lucky the last year in regard to contagious diseases not having any reported to the board.—F. L. Tyler, Sec.

FRANKLIN. Nothing reported to the board in either year.—Geo. U. Dyer, Sec.

FREEDOM. 1900. We are pleased to report that we have had no cases of contagious diseases in town for the past year. We have kept a watchful eye on outhouses and privies and have often recommended that they be kept in better order. The people of this town take great pride in the cleanliness of their sanitary arrangement.—Lorenzo D. Jones, Sec.

1901. No infectious diseases reported to the board during the year.—Dr. A. M. Small, H. O.

FREEMAN. Measles prevailed to a great extent all over town in 1900. That epidemic, with four cases of scarlet fever in 1901, was all the board had to report for the two years.—J. M. Burbank, Sec.

FREEPORT. 1900. Eight nuisances reported; all have been attended to. Six cases of diphtheria in one house was the only infectious disease reported. Antitoxin was used with the best of results.

1901. Five nuisances removed. No contagious diseases. When cases of consumption occur, we advise keeping the patients out of doors as much as possible.—Dr. N. D. Hyde, Sec.

FRENCHVILLE. The only infectious disease reported during the two years past was three cases of diphtheria in 1900 and one in 1901. Formaldehyde was used for disinfecting.—Dr. Isidore Coté.

FRIENDSHIP. One doubtful case of diphtheria, but nothing else that required the attention of the board during the two years.—Edwin M. Cooke, Sec.

FRYEBURG. 1900. Two nuisances removed. Two cases of typhoid fever.

1901. One nuisance reported and removed. No infectious disease except two cases of scarlet fever.—Dr. A. C. Ferguson, Sec.

GARDINER. 1900. Five nuisances reported, three of which were removed. Eight cases of diphtheria, eleven of scarlet fever, and five of typhoid fever. There were no fatal cases of diphtheria. Antitoxin was used in all.

1901. Five nuisances reported; four removed. Twenty-two cases of diphtheria, nine of scarlet fever, and four of typhoid. In cases of pulmonary tuberculosis, we give circular and directions for disinfection of sputum.—Dr. F. E. Strout, H. O.

GARFIELD PLANTATION. Nothing to report except seven cases of scarlet fever in 1900 and one in 1901. There was one death from scarlet fever that we have not reported.—Louis K. Tilley, Sec.

GARLAND. No infectious diseases reported in either year except one case of typhoid fever in 1900 and one of diphtheria in 1901. In cases of consumption, the people are supplied with circulars. The sputum is generally received in waxed paper and burned.—Dr. F. A. C. Emerson, Sec.

GEORGETOWN. 1901. No nuisances reported. Two cases of scarlatina, but no other infectious disease.—W. H. Dearborn, Sec.

GILEAD. 1900. This town has been very fortunate the past year in not having a single case of any kind of contagious disease, and the board of health has not been called upon to remove any nuisances.—C. H. Cole, Sec.

GLENBURN. The town has been favored during the past two years. There has not been any case of severe sickness. There was, last year, very much complaint about one nuisance; it being a case where fish offal was deposited near dwelling houses 150 or 200 feet from the main road. The local board took hold of the matter and after much talk and some very earnest threats, the party was induced to go out of the business, so that this year we are free from any such nuisance. As the years go by, the people are beginning to respect the actions of the local boards of health. They are becoming educated to it so that the board is not receiving so much opposition. This board has never been backward in enforcing its duties when it was necessary to do so.—John F. Tolman, Sec.

GLENWOOD PLANTATION. 1900. One nuisance removed. No contagious diseases. No improvements have been made this year.—Wm. H. Grant, Sec.

1901. Nothing to report for the year.—J. F. Read, Sec.

GORHAM. 1900. Seven nuisances removed. Four cases of diphtheria, ten of scarlet fever, and seven of typhoid.

1901. Two nuisances reported and removed. One case of diphtheria, two of scarlet fever, and four of typhoid fever. In case of diphtheria, antitoxin was used with good results.—Geo. W. Heath, Sec.

GOULDSBORO. 1900. No infectious diseases.—S. L. Tracy, Sec.

1901. No nuisances reported. No cases of diphtheria or typhoid fever, but one of scarlet fever.—Ira Shaw, Sec.

GRAFTON. We have had no contagious diseases during the last two years.—J. W. Chapman, Sec.

GRAND FALLS PLANTATION. 1900. One nuisance removed. No cases of contagious disease.—A. S. Folsom, Chr.

GRAND ISLE. Nothing reported for two years.—Florent Sanfacon, Sec.

GRAND LAKE STREAM PLANTATION. 1900. No infectious diseases.—W. B. Hoar, Sec.

GRAY. 1900. Two cases of typhoid fever.—Geo. W. Osgood, Sec.

1901. One nuisance reported to the board and removed. No contagious diseases reported.—L. T. Cushing, Sec.

GREENBUSH. 1900. One nuisance removed. One case of scarlet fever. Cases of typhoid fever are not reported to the board so I am unable to give you the correct number we have had.—H. F. Harris, Sec.

1901. One nuisance reported and removed. One case of typhoid fever.—Albion Harriman, Sec.

GREENE. 1900. No nuisances reported to the board. Three cases of scarlet fever, but no other infectious disease.—Geo. E. Parker, Sec.

1901. One nuisance removed. No cases of diphtheria or scarlet fever, but two of typhoid.—Dr. O. E. Hanscom, H. O.

GREENVALE PLANTATION. There were no contagious diseases in Greenvale during the past two years.—Frank A. Hight, Sec.

GREENVILLE. 1900. Two nuisances removed. Five cases of typhoid fever in three houses.—Dr. Hiram Hunt, H. O.

1901. Two nuisances reported to the board and removed. One case of smallpox and five of typhoid fever, but none of diphtheria or scarlet fever. We have no system of public sewerage and private sewers run into the highway in several instances.—A. L. Fletcher, Sec.

GREENWOOD. Two nuisances were removed in 1900, but none in 1901. There were no infectious diseases during the two years with the exception of one case of typhoid fever in 1901.—A. C. Libby, Sec.

GUILFORD. 1900. No work for the board during the year.—Dr. Q. A. Bridges, Sec.

1901. One nuisance removed. One case of scarlet fever. Formaldehyde was used for disinfecting.—Dr. R. H. Marsh, Sec.

HALLOWELL. 1900. Three nuisances removed. Three cases of diphtheria, one of scarlet fever, and two of typhoid.

1901. Five nuisances reported and removed. Two cases of scarlet fever and thirty of typhoid. Disinfection was done by a thorough use of formaldehyde.—E. M. Henderson, Sec.

HAMLIN PLANTATION. 1900. No infectious diseases.—John Ayotte, Sec.

1901. Nothing reported during the year. No public improvements have been made.—Thos. Smith, Sec.

HAMMOND PLANTATION. The plantation has been remarkably free from contagious diseases for the last two years.—John W. Davidson, Sec.

HAMPDEN. 1900. One nuisance removed. One case of diphtheria and six of typhoid fever, but none of scarlet fever.—Dr. W. H. Nason, H. O.

1901. No nuisances reported. The past year has been an unusually healthy one, two mild cases of typhoid fever being all the diseases reported to this board. The board of health voted to offer free vaccination, which was generally accepted by the town.—Dr. C. F. Cowan, H. O.

HANCOCK. 1900. No contagious diseases.—Benj. Shute, Sec.

HANOVER. 1901. One nuisance removed. Four cases of scarlet fever.—Harry E. Dyer, Sec.

HARMONY. 1900. Three nuisances reported; all removed. Three cases of typhoid fever, but no other contagious diseases. The town of Harmony has been well looked after this year by the board of health.

1901. Six nuisances removed. One case of diphtheria in which antitoxin was used with good results.—W. W. Jacobs, Sec.

HARPSWELL. 1901. One nuisance reported, but the local board could find no cause for complaint. Four cases of scarlet fever and two of typhoid. The local board issued free vaccination to all the inhabitants of Harpswell.—H. O. Coombs, Sec.

HARRINGTON. Nothing reported for either year except one case of scarlet fever in 1900 and one of typhoid in 1901.—E. R. McKenzie, Sec.

HARRISON. These two years have been uneventful for our board, there being only one case of diphtheria and one of typhoid fever in 1900 and one case of typhoid fever in 1901. Whooping-cough was prevalent in December, 1901, and is still going the rounds.—Dr. E. A. Wight, Sec.

HARTFORD. 1900. Two cases of diphtheria in which antitoxin was used. Both cases recovered. The board of health have had really no work to do until this present outbreak of diphtheria.

1901. Eleven cases of diphtheria. Antitoxin was used with excellent results. Two deaths occurred before the doctors called it diphtheria. One child was saved by the use of antitoxin after the doctor thought there was no chance whatever.—T. B. W. Stetson, Sec.

HARTLAND. 1900. Four nuisances removed. Three cases of typhoid fever, but none of diphtheria or scarlet fever.

1901. Five nuisances removed. Five cases of diphtheria, four of scarlet fever, and four of typhoid.—E. K. Fuller, Sec.

HAYNESVILLE. 1900. No infectious diseases reported in 1900.

1901. Two nuisances reported and removed. Two cases of scarlet fever and five of typhoid—James F. Bryson, Sec.

HEBRON. 1900. We have had no fevers or sickness as the result of a very short water supply last summer and fall. Several farmers in town have purchased windmills and get water from springs or wells a long distance away. They use iron pipes. I think no lead pipe has been used by any one.

1901. No infectious diseases. Free vaccination was offered for all in town. The grip visits us with cold weather. There were several cases in December. One was very severe, but no deaths.—L. L. Phillips, Sec.

HERMON. Our town has been free from contagious diseases for two years. It is in an excellent sanitary condition.—Dr. F. R. Whitaker, Sec.

HERSEY. No infectious diseases reported for two years except four cases of scarlet fever and one of typhoid. No private or public improvements have been made.—Lowell M. Davis, Sec.

HIGHLAND PLANTATION. 1901. There have been no contagious diseases and no work for the board of health to do.—L. C. Parsons, Sec.

HIRAM. 1900. Two cases of typhoid fever. I think physicians should report to board of health or State board the details relating to disinfection, and see that rooms and bedding, clothing, etc., are disinfected. I judge that in cases of tuberculosis the clothing is hung on the fence to be "aired," as the old saying has it. We propose the coming year or the present, to have this important matter fully attended to.

1901. Two cases of scarlet fever reported for this year. I am coming to believe in the theory of Lysurgus, the Grecian law-

giver, that "children are the property of the State," and should be trained and educated on that basis in order to secure for themselves, and for the State, the best possible results. I strongly favor a law providing that all children in schools shall be vaccinated; that a record shall be kept by all physicians of all vaccinations, giving name and date, also providing free and compulsory vaccination for persons or families unable or unwilling to attend to the duty. A vigorous, persistent movement every two years would finally develop and test a law that would furnish ample protection for all at the public expense.—L. A. Wadsworth, Sec.

HODGDON. No infectious diseases reported during the two years except one case of typhoid fever in 1901.—Moses Benn, Sec.

HOLDEN. One nuisance removed in 1901. We have been free from contagious diseases during the past two years except one case of typhoid fever and a few cases of chickenpox that occurred among the children in a mild form.—G. W. Clark, Sec.

HOLLIS. Nothing reported in the way of infectious diseases except two cases of diphtheria in 1900 and one of typhoid in 1901. In one case of diphtheria, antitoxin was used with good results.—S. G. Rumery, Sec.

HOPE. No contagious diseases except one case of diphtheria in 1901.—Geo. F. Taylor, Sec.

HOULTON. 1900. Forty nuisances reported; thirty-nine removed. One case of diphtheria, three of scarlet fever, and twenty-five of typhoid. Antitoxin was used in cases of diphtheria with good results. Our water works and sewer system have been extended during the past year.

1901. About thirty nuisances reported; all have been removed as far as possible. Three cases of diphtheria, seven of scarlet fever, and thirty-one of typhoid fever.—Dr. C. E. Williams, Sec.

HOWLAND. 1900. Two nuisance removed. Four cases of scarlet fever and five of typhoid. I would suggest that as some physicians are somewhat negligent in reporting cases of contagious and infectious diseases some new and more stringent rule or law be enacted to better enforce it.—Dr. F. D. Weymouth, Sec.

HUDSON. We have had no work to do for the past two years. In 1901, we gave free vaccination.—John B. Southard, Sec.

HURRICANE ISLE. 1900. No nuisances reported and no cases of diphtheria, scarlet fever, or typhoid.—E. P. Patterson, Sec.

1901. No infectious diseases reported. Had all vaults cleaned and drains opened and put in good shape.—M. E. Landers, Sec.

INDUSTRY. One nuisance was removed in each year. No contagious diseases except five cases of diphtheria in 1901 in which antitoxin was used with good results.—C. B. Fish, third member.

ISLAND FALLS. 1900. One nuisance removed. Fourteen cases of scarlet fever and six of typhoid.

1901. Three nuisances reported and removed. Eight cases of typhoid fever, very light, and seven of scarlet fever. Formaldehyde was used for disinfecting.—W. S. Leavitt, Sec.

ISLE AU HAUT. 1900. Nothing reported during the year.—Asa D. Hopkins, Sec.

1901. We have not had any kind of contagious disease in our town for the year of 1901. We are on guard all the time against such diseases and have done all that could be done to prevent their getting into the place. We are looking after all possible cases of nuisance and attend to them at once.—Dr. S. W. Bridges, H. O.

ISLESBORO. 1900. Three nuisances removed. One case of scarlet fever, but no other infectious diseases have been reported.—Dr. E. D. Williams, H. O.

1901. We have had but two nuisances reported to the board and they were quickly removed. We have had no contagious diseases this year of any kind.—J. A. Sprague, Sec.

JACKMAN PLANTATION. 1901. No nuisances reported. Two cases of scarlet fever and five of typhoid. We have used a good deal of care and thus limited everything to the place of occurrence.—Dr. N. E. Nichols, H. O.

JACKSON. 1900. Nothing reported to the board except one case of scarlet fever and two of typhoid.—W. E. Warren, Chr.

JAY. 1900. One nuisance reported but not removed. Fourteen cases of diphtheria, none of scarlet fever, and five of typhoid fever. Antitoxin was used with good results in all cases of diphtheria except three. Formalin was used for disinfecting. All the disinfection that we have had to do the past year has been a source of a great deal of satisfaction to ourselves and the public. It has been so much so that we have overcome to a great extent the opposition that all boards of health meet with. I wish to

speak a good word in favor of the antitoxin treatment in diphtheria. I have used it early and late with excellent results.—Dr. F. W. Merritt, H. O.

1901. No nuisances reported. Two cases of diphtheria and one of typhoid fever, but none of scarlet fever.—S. B. Farnum, Sec.

JEFFERSON. 1900. Four cases of diphtheria and two of scarlet fever.—J. J. Bond, Sec.

1901. No infectious diseases. I would make a suggestion in regard to disinfecting a great number of school-books at once (or a small number either). We used this method two years ago when we had an outbreak of scarlet fever and all the books in one of our schools were probably infected. We used formaldehyde by sprinkling it freely between the leaves of the book as the leaves were turned. An oil-can was used for the purpose, and enough of the solution was used to dampen the book thoroughly. No harm was done to the books. They were not even spotted except in case of one or two it caused the ink to "run" slightly. We packed them in a tight box for a day or two and then aired them thoroughly to remove the formaldehyde. I have not seen this method recommended and would suggest it for its convenience. I cannot see why it is not efficient.—Dr. A. W. Nash, H. O.

JONESBORO. No contagious diseases reported during the two years except a few cases of measles in 1900.—D. C. Marston, Sec.

JONESPORT. 1900. Three nuisances removed. One case of scarlet fever and four of typhoid.—E. B. Sawyer, Sec.

KENDUSKEAG. One nuisance was removed in 1901. No cases of infectious disease reported except one case of scarlet fever and one of typhoid in 1900. Formaldehyde was used for disinfecting after scarlet fever.—Dr. J. F. Benjamin, Sec.

KENNEBUNK. 1900. Fifteen nuisances removed. Three cases of diphtheria, six of scarlet fever, and four of typhoid fever. In the four cases of consumption which occurred, great care was taken to disinfect and guard households.

1901. Nine nuisances reported; all removed. Two cases of scarlet fever and three of typhoid.—Dr. Frank M. Ross, Sec.

KENNEBUNKPORT. 1900. Twelve nuisances removed. Two cases of diphtheria, fifteen of scarlet fever, and two of typhoid

fever. Diphtheria antitoxin was used in one case with good results. In the second case, the disease had made rapid headway before a physician was called, and the child had always been sickly. For the public improvements we have been agitating the question of a complete system of sewerage. In cases where we quarantined dwellings in which there were contagious diseases, we always had some person to wait on the family whom they wished to have and in some cases where we employed one of their selection, we have learned from experience that such families take too much liberty and bad results have followed. Now we employ one whom we know is honest and will keep us well informed and help us in our work.

1901. Nine nuisances reported; all have been removed by the board. One case of diphtheria, scarlet fever, and typhoid fever. Wm. H. Cluff, Sec.

KINGFIELD. 1900. Three nuisances removed. One case of scarlet fever and three of typhoid, but none of diphtheria. For disinfecting, we used steam and formaldehyde. Several houses have been fitted with modern plumbing for closets, etc. Measles have been quite prevalent, but, as the parents are willing to keep their children out of school if they have been exposed, we have not had to close the schools.

1901. Five nuisances removed. Two cases of scarlet fever and one of typhoid. The town has put in main sewer and two branches accommodating fifty or sixty families. We have an excellent water supply from a pond in the mountains.—Dr. R. D. Simons, Sec.

KINGSBURY PLANTATION. Nothing reported for either year. Guy L. Cameron, Sec.

KITTERY. 1900. Seven nuisances reported and removed. About twenty-five cases of scarlet fever and one of typhoid. The town also had an epidemic of measles, many adults as well as children being sick with them.—Frank O. Kuse, Sec.

1901. Eight nuisances removed. No infectious diseases reported for the year.—Dr. F. E. Shapleigh, Sec.

KNOX. One nuisance reported but not removed in 1900. Nothing else for the two years.—E. L. Thompson, Sec.

LAGRANGE. 1900. One nuisance removed. No infectious diseases.

1901. No nuisances reported to the board. Two cases of smallpox, two of scarlet fever, and one of typhoid.—Perley E. Speed, Sec.

LAKE VIEW PLANTATION. 1900. Nothing reported to the board during the year.—Ai Clapp, Jr., Sec.

1901. No work for the board for the year.—C. C. Roberts, Sec.

LAKEVILLE PLANTATION. Our plantation has been quite healthy during the past two years. Have had no contagious diseases of any kind.—James Hamm, Sec.

LAMOINE. 1900. One nuisance removed. One case of typhoid fever, but none of scarlet fever or diphtheria. At Lamoine Point two miles of water pipe have been laid by private parties through a thickly settled part of the town introducing pure spring water conveyed from Blunts lake. This lake situated two hundred feet above sea level, is fed by springs, the water being clear as crystal and very pure.—James T. Grant, Sec.

1901. Nothing reported for the year.—John F. Lear, Sec.

LANG PLANTATION. 1900. No cases of diphtheria, scarlet fever, or typhoid fever reported to the board.—J. L. Harris, Sec.

1901. The board has had nothing to do the last year.—Geo. Z. Vaughn, Sec.

LEBANON. One nuisance was reported to the board and removed in 1901. No infectious diseases except one case of scarlet fever and two of typhoid in 1900.—S. D. Lord, Sec.

LEE. 1900. No nuisances reported. Two cases of scarlet fever. No improvements have been made.—Dr. Geo. F. Way, H. O.

1901. One case of diphtheria and seven of scarlet fever, but no other contagious diseases. Formaldehyde disinfection was used.—Lee Weatherbee, Sec.

LEEDS. Nothing reported in either year except one case of diphtheria in 1900 and one of typhoid fever in 1901.—E. A. Mills, Sec.

LEVANT. 1900. No infectious diseases.—John White, Sec.

1901. No nuisances reported. No contagious diseases during the year.—Frank White, Sec.

LEWISTON. 1900. Eighty-seven nuisances reported, seventy-nine of which have been removed by the board. Forty-one cases of diphtheria, sixteen of scarlet fever, and six of typhoid. Anti-

toxin was used with good results so far as I know in cases of diphtheria. We voted to issue monthly statements of our business, and to issue call cards for garbage team with general advice on back.

Our hardest work, but one in which we have been successful, has been to convince some classes of persons that we have the law to back us in the matter of taking care of quarantined persons who may not have friends to care for them.—James E. Scott, Sec.

LIBERTY. We have had no infectious diseases reported except two cases of scarlet fever and one of typhoid in 1900, and one case of typhoid fever in 1901. In cases of consumption, we have had the sputum burned and house thoroughly disinfected.—Dr. Chas. B. Holt, Sec.

LIMERICK. No report to make as we have had no work to do the past two years.—John C. Hayes, Sec.

LIMESTONE. No nuisances reported during two years. The only infectious diseases were eight cases of scarlet fever in 1900, and two of diphtheria, and seven of typhoid fever in 1901.—A. D. Hatfield, Sec.

LIMINGTON. 1900. Two nuisances removed. One case of diphtheria and two typhoid fever, but none of scarlet fever. In case of diphtheria, antitoxin was used with good results.

1901. No infectious diseases reported with the exception of one case of diphtheria. Disinfecting was done by boiling, steam, and formaldehyde.—Dr. J. F. Moulton, Sec.

LINCOLN. 1900. Five nuisances reported; all removed. Nine cases of scarlet fever, but no other contagious disease reported.—Dr. C. Fuller, Sec.

1901. Nothing reported except two cases of scarlet fever.—A. Weatherbee, Sec.

LINCOLN PLANTATION. 1900. Nothing reported during the year.—Horace Bennett, Sec.

LINCOLNVILLE. 1900. Five nuisances removed. Three cases of diphtheria, nine of scarlet fever, and eleven of typhoid.

1901. Two nuisances reported to the board and removed. One case of diphtheria, three of scarlet fever, and five of typhoid fever.—Dr. E. F. Brown, H. O.

LINNEUS. Nothing reported for the two years with the exception of two nuisances which were removed. In cases of

pulmonary tuberculosis, the sputa was ordered burned.—Dr. Robert Boyd, H. O.

LISBON. 1900. Five nuisances removed. Thirty-five cases of diphtheria, five of scarlet fever, and six of typhoid. Antitoxin was used in every case of diphtheria with good results.

1901. Twenty-five nuisances removed by the board. Nine cases of diphtheria and four of scarlet fever, but none of typhoid.—F. A. Jordan, Sec.

LITCHFIELD. 1900. Four nuisances reported; all were removed. Two cases of typhoid fever were the only infectious diseases during the year.

1901. One nuisance removed. Two cases of diphtheria, but none of typhoid or scarlet fever.—Gardiner Roberts, Sec.

LITTLETON. One nuisance removed in 1900. Two cases of typhoid fever in 1900, but nothing else reported for the two years.—W. P. Curtis, Sec.

LIVERMORE. Two nuisances removed in both 1900 and 1901. We have had no occasion to disinfect as there have been no contagious diseases, but we stand in readiness to do so if needed. The children are well vaccinated. We shall keep schoolhouses thoroughly cleansed.—F. H. Boothby, Sec.

LONG ISLAND PLANTATION. Nothing reported for the two years.—Wm. S. Rich, Sec.

LOVELL. No infectious diseases in the two years except five cases of scarlet fever in 1900. When cases of pulmonary tuberculosis occur, we use every precaution to keep others from taking it by cleanliness and disinfection.—Dr. C. P. Hubbard, Sec.

LOWELL. 1900. Two cases of typhoid fever were all the contagious diseases during the year.—James E. Cabel, Sec.

1901. One nuisance removed. We have had no infectious diseases the past year. Our town is in a very healthy condition. J. R. Shorey, Sec.

LUBEC. 1900. Four nuisances reported and removed. No infectious diseases.

1901. Two nuisances removed by the board. Ten or twelve cases of typhoid fever.—F. W. Fanning, Sec.

LUDLOW. 1900. Two nuisances removed. We have given our attention to the sanitary condition of our school-buildings and have had them thoroughly cleansed.—R. H. Thompson, Sec.

1901. We have not made any public or private improvements or anything else. Have made no changes in methods or work. At present, we are having a very quiet time and hope it will always remain so.—David Small, Sec.

LYMAN. 1900. A few cases of measles are all we have had reported the past year.

1901. One case of diphtheria. In this case extreme caution was used and the result showed it was successful in confining it to one family and an individual case. We, as a board, have not been notified of any case where it required the abatement of a nuisance.—F. E. Tripp, Sec.

MACHIAS. 1900. No cases of infectious disease.—Dr. F. L. Shaw, Sec.

1901. Six nuisances reported, two of which have been removed. One case of typhoid, but none of scarlet fever or diphtheria. We have no public water works and no system of sewerage. In summer, this makes a very bad condition of affairs. In many places the drains from water-closets and sinks simply run out under the sidewalks. In daytime people complain all over town of odors arising therefrom. The town will not vote to put in a sewerage system and we cannot seem to remedy it.—Dr. A. L. Smith, H. O.

MACHIASPORT. 1900. Five cases of scarlet fever and one of typhoid.—W. F. Grant, third member.

1901. One case of scarlet fever, but no other infectious disease reported.—E. N. Palmer, Sec.

MACWAHOC PLANTATION. 1900. Nothing reported to the board.—G. D. O'Roak, Sec.

1901. No contagious diseases. We call this a very healthy place.—M. Johnson, Sec.

MADAWASKA. 1901. No cases of infectious disease.—Eloi Albert, Chr.

MADISON. 1900. Ten nuisances reported; all removed except two. One case of diphtheria, two of scarlet fever, and five of typhoid. In cases of consumption, circulars on tuberculosis were furnished.—Dr. W. G. Sawyer, H. O.

1901. Six nuisances removed. Four cases of scarlet fever and two of typhoid.—D. L. Churchill, Sec.

MADRID. 1900. Two cases of diphtheria and a few cases of measles.

1901. There has not been a call made on the board during the year. We have offered free vaccination. Shall act as promptly as possible in cases of any infectious or contagious disease.—L. C. Witham, Sec.

MANCHESTER. 1900. One case of diphtheria and two of typhoid fever, but no other infectious diseases.

1901. No contagious disease reported with the exception of one case of consumption. In this case, the utmost care was taken by attendant and patient that the sputum should not get on the clothing and it was either disinfected or burned.—G. M. Knowles, Sec.

MAPLETON. One nuisance reported in 1900. No infectious diseases reported in either year except fifteen cases of scarlet fever in 1900 and three in 1901.—L. W. Hughes, Sec.

MARIAVILLE. 1900. No infectious diseases reported.—Fred C. Grover, Sec.

MARION. We have had no contagious diseases and no work of any kind has been done by the board.—B. L. Smith, Sec.

MARSHFIELD. 1900. Two nuisances removed.—L. B. Thaxter, Sec.

1901. No infectious or contagious diseases reported.—E. L. Hanscom, Sec.

MARS HILL. One nuisance removed in 1900. Thirty cases of scarlet fever in 1901 and four in 1900, but no other infectious disease.—C. N. York, Sec.

MASARDIS. Nothing reported in either year with the exception of six or more cases of diphtheria.—Fred W. E. Goss, Sec.

MASON. One nuisance removed in 1901. The past two years have been exceptionally healthy ones, there having been no sickness reported to the board. In 1901, we had a physician go through the town and all who would be were vaccinated.—Addison S. Bean, Sec.

MATINICUS ISLE PLANTATION. We have not had any cases of contagious disease during the two years.—W. B. Young, Sec.

MATTAMISCONTIS. One nuisance removed in 1900. No other work for the board for either year.—H. C. Roberts, Sec.

MATTAWAMKEAG. 1900. No infectious diseases. A. F. Martin, Sec.

1901. Four cases of typhoid fever.—F. A. Perley, Sec.

Maxfield. Three cases of typhoid fever in 1900 and two in 1901. There have been no improvements during the two years.

The people of this town as a general thing are quite healthy.—James Wiley, Sec.

MAYFIELD PLANTATION. One nuisance reported and removed in 1901. Fortunately we have been exempt from contagious diseases the past two years and the work of the board has been light.—S. A. Chamberlain, Sec.

MECHANIC FALLS. 1900. Nine nuisances removed. Two cases of diphtheria, two of scarlet fever, and five of typhoid fever. The physicians in this place use antitoxin immediately in all suspected cases of diphtheria, and always with good results.

1901. Six nuisances reported; all removed. One case of diphtheria and three of typhoid fever.—M. N. Royal, Sec.

MEDDYBEMPS. Nothing to report in either year.—J. S. Bridges, Sec.

MEDFORD. 1900. One of the pupils in the public school contracted scarlet fever. She was at once placed under quarantine restrictions, with the result that no other cases have appeared in town.

1901. Good health has generally prevailed and no contagious diseases have appeared in town this year. Free vaccination was provided and a large percentage of the population were vaccinated.—E. G. Lovejoy, Sec.

MEDWAY. 1900. We take every precaution that lays in our power to keep the town in good healthy condition. Have had no contagious diseases except one case of typhoid fever.

1901. One nuisance removed. We notified the selectmen to clean up all filth that has accumulated through the winter and they complied promptly. We have been free from all contagious diseases with the exception of one case of typhoid fever.—C. F. Moore, Sec.

MERCER. Nothing reported except one nuisance which was removed in 1900.—I. C. Tracy, Sec.

MERRILL PLANTATION. 1901. No contagious diseases.—Dr. A. B. Libby, H. O.

MEXICO. 1900. Two nuisances removed. One case of typhoid fever. In cases of pulmonary tuberculosis, the families were furnished with printed circulars and advised concerning them.—Dr. H. J. Binford, Sec.

1901. Three nuisances reported to the board and removed by them. Two cases of diphtheria, three of scarlet fever, and five of typhoid fever.—Geo. R. Wills, Sec.

MILBRIDGE. Two cases of scarlet fever, one of diphtheria, and five of typhoid fever in 1900, and one of diphtheria and one of scarlet fever in 1901 were all the infectious diseases reported during the two years.—Dr. J. A. Walling, Sec.

MILFORD. 1900. Seven cases of scarlet fever and five of typhoid. Formaldehyde was used for disinfecting.—Albion Oakes, Sec.

1901. One nuisance removed. No contagious diseases.—J. E. Canney, Acting Sec.

MILLINOCKET. 1901. Four nuisances removed. Two cases of scarlet fever and twenty of typhoid, but none of diphtheria. We have a system of public water works and an efficient sewerage system also. It is pleasing to possess citizens who have the disposition to appropriate sums for the maintenance of works that are allied to public and private health. No money should be more generously appropriated than that which goes into better drainage appealing at once to the good health and consequent earning and producing capacity of our citizens. All houses, premises, or lots contiguous to any street in which sewers are placed have been connected with said sewers. In all cases of infectious diseases, we have used the utmost care in disinfecting; adopting any other precaution possible to prevent the occurrence of new cases. My experience has suggested that towns should furnish disinfectants to householders of infected houses as it is the logical thing for such householders to expect. Improved methods of removing garbage will no doubt be secured the coming year. In conclusion would say that for sanitary condition Millinocket has few that can excel her.—Dr. P. W. Cody, Sec.

MILO. 1900. Thirty-one cases of scarlet fever, but none of diphtheria or typhoid.—A. W. Murray, Sec.

MILTON PLANTATION. 1900. No contagious diseases.—E. A. Farnum, Chr.

1901. One case of diphtheria and six of scarlet fever. Anti-toxin was used and in three days the patient was able to leave his bed.—Henry Davis, Sec.

MINOT. 1900. Nothing reported for the year.—Geo. F. Bridgham, Sec.

1901. One nuisance removed. Three cases of typhoid fever.—W. E. Leland, Sec.

MONHEGAN PLANTATION. 1900. No infectious diseases.—E. G. Wincapaw, Sec.

1901. Two nuisances reported and removed. Six cases of scarlet fever, but no other infectious disease.—R. Davis, Sec.

MONMOUTH. 1900. Our town has been remarkably free from contagious diseases for the last year. One mild case of typhoid fever, two cases of measles, and two of whooping cough. We have kept a watchful eye on outhouses and privies, and have quite often recommended that they be kept in better order. Our people are learning to take care of themselves in these matters, which is very pleasing to the board of health.—J. L. Orcutt, Sec.

1901. One nuisance reported but not removed. No contagious diseases.—John B. Fogg, Sec.

MONROE. Two nuisances reported in 1900, one of which was removed. No contagious diseases during the two years except four cases of measles in 1900.—Dr. H. A. Holt, H. O.

MONSON. No infectious diseases reported in either year with the exception of forty cases of scarlet fever in 1900 and five in 1901; also one case of smallpox in 1901. Formaldehyde disinfection was used.—Dr. J. Jackson, Sec.

MONTICELLO. 1900. This town has been singularly free from contagious diseases the past year. No cases of diphtheria, scarlet fever, or typhoid.—L. E. Stackpole, Sec.

1901. Three or four cases of scarlet fever.—S. P. Archibald, Sec.

MONTVILLE. 1901. No infectious diseases reported to the board.—Dr. A. D. Ramsey, H. O.

MOOSE RIVER PLANTATION. 1900. No cases of scarlet fever, or none of diphtheria or typhoid fever.—David Hughey, Sec.

1901. Three cases of scarlet fever.—Dr. N. E. Nichols, H. O.

MORO PLANTATION. No contagious diseases during the two years and no cases of pulmonary tuberculosis.—S. T. Bates, Sec.

MORRILL. Nothing to report for the two years.—Dr. T. N. Pearson, H. O.

MOSCOW. No nuisances reported to the board. No contagious diseases except three cases of scarlet fever in 1901.—F. H. Gilman, Sec.

MOUNT CHASE. We haven't had any work in our town for two years beyond what we usually have.—J. A. McDonald, Sec.

MOUNT DESERT. 1900. Three nuisances removed. Two cases of diphtheria and one of typhoid fever. Antitoxin was used in both cases of diphtheria with the best of results. A small

extension has been put on to the sewer system at Northeast Harbor.

1901. Three nuisances reported and removed. Twenty cases of scarlet fever and one of typhoid. There has been a main sewer put in at Seal Harbor; also some branch sewers at Northeast Harbor. Both of the above places will be in the best of sanitary condition this season. The reason for our having such an outbreak of scarlet fever was that it was in so mild a form that the first cases were not reported to our board and many had been exposed before we heard of it. We then took vigorous measures and soon stamped it out. Although it was of so mild a nature, one or two cases developed into more severe forms, which if they had come at first instead of later we should have had no trouble in stopping the spread.—J. C. Hill, Sec.

MOUNT VERNON. 1900. One case of diphtheria, one of typhoid fever, twelve of measles in a mild form, and two of whooping-cough. There were two cases of consumption reported also. In these, we furnished the families with circulars and advised caution in every respect. Our orders were to burn or bury the sputum.

1901. One case of diphtheria and several of pneumonia. The case of diphtheria was a child about three years of age living in the southeast portion of the town. Upon being notified, our board of health at once held a consultation and immediately went to the district in which the child was sick. After a thorough investigation, we decided to close the school. We think every precaution has been taken to prevent the spread of the disease and do not anticipate any further cases. We think the child contracted the disease in another town.—A. P. Cram, Sec.

NAPLES. No work has come to the notice of the board during the last two years.—John L. Meserve, Sec.

NEWBURG. We have not had a case of infectious disease reported for two years.—Dr. E. C. Newcomb, H. O.

NEW CANADA PLANTATION. 1900. Seven cases of diphtheria, but none of typhoid or scarlet fever.—Thos. Daigle, Sec.

NEWCASTLE. Two nuisances removed in 1901. We have been exceptionally free from contagious diseases during the past two years.—D. S. Glidden, Sec.

NEWFIELD. Nothing has been reported to the board for two years.—Dr. E. C. Jenigor, H. O.

NEW GLOUCESTER. 1900. One nuisance removed. Three cases of diphtheria, but no other infectious disease reported.—E. J. Mitchell, Sec.

1901. No nuisances reported. Four cases of diphtheria and two of typhoid fever. In cases of diphtheria, antitoxin was used with good results.—Wm. L. Shurtleff, Sec.

NEWPORT. 1900. Five nuisances reported and removed. We have extended the sewer system about 1000 feet. No contagious diseases.

1901. Six nuisances reported; all have been removed. One case of typhoid fever.—F. M. Shaw, Sec.

NEW PORTLAND. One nuisance removed in 1900. One case of typhoid fever in each year, but no other infectious disease. In 1901, free vaccination was offered by the board.—E. Hutchins, Sec.

NEWRY. 1901. One nuisance removed. We have not had any contagious diseases in this town in the last year.—H. M. Kendall, Sec.

NEW SHARON. One nuisance removed in 1900. No infectious diseases during either year.—F. C. Hale, Sec.

NEW SWEDEN. Nothing was done by the board during the two years, except the offering of free vaccination in 1901.—N. E. Ringdahl, Sec.

NEW VINEYARD. 1900. No nuisances reported. One case of scarlet fever.—W. A. Lee, Sec.

1901. Two cases of diphtheria, eleven of scarlet fever, and two of typhoid. Antitoxin was used with good results in cases of diphtheria. Formaldehyde was used for disinfecting.—E. J. Voter, Sec.

NOBLEBORO. One nuisance reported and removed in 1900. No cases of contagious disease except one case of typhoid fever and five of measles in 1900.—A. S. Winchenbauch, Sec.

NORRIDGEWOCK. 1900. One nuisance reported and removed at once. Two cases of scarlet fever and six or eight of measles. Consumption is too much neglected, and public spitting in halls and on the sidewalks ought to be prohibited by law.

1901. Have had a very healthy year, a few cases of chicken-pox, measles, and whooping-cough being the only diseases during the year. The importance of precaution in every contagious disease is urged upon every person.—F. C. Holt, Sec.

NORTH BERWICK. 1901. One nuisance removed. Two cases of scarlet fever and two of typhoid.—Haven A. Butler, Sec.

NORTHFIELD. There have been no contagious diseases in our town the past two years and the board has not been called upon.—F. B. Albee, Sec.

NORTH HAVEN. 1900. Two nuisances reported, one of which was removed. No infectious diseases.

1901. One nuisance removed. Nothing else to report for the year.—J. B. Crockett, Sec.

NORTHPORT. One nuisance removed in each year. Two cases of scarlet fever in 1900 and one of diphtheria in 1901 were the only contagious diseases during the two years.—F. A. Rhodes, Sec.

NORTH YARMOUTH. One nuisance reported and removed in 1900. Five cases of diphtheria in 1900 and three of scarlet fever in 1901. In cases of diphtheria, antitoxin was used freely with good results.—E. D. Loring, Sec.

NORWAY. 1900. Eighteen nuisances reported; all removed. Five cases of diphtheria, eight of scarlet fever, and three of typhoid. Antitoxin was used in three of the cases of diphtheria with fair results. There has been quite an improvement in regard to the abatement of nuisances. There is much interest shown on the part of the inhabitants about keeping the town clean. There is chance for more improvement on a sanitary line.

1901. Twenty-eight nuisances removed. Two cases of diphtheria and one of typhoid fever. The board of health have looked well after the contagious diseases that we have had. We hope to make many improvements in the coming year.—Dr. S. A. Bennett, Sec.

No. 8 PLANTATION. No diseases of any kind reported to the board in either year.—Hiram E. Archer, Sec.

No. 14 PLANTATION. No infectious diseases during two years. In cases of consumption, we have advised cleanliness and thorough ventilation. In 1901, free vaccination was provided, and all other precautions have been taken against contagion that we thought necessary.—Sidney W. Gray, Sec.

No. 21 PLANTATION. 1900. No infectious diseases.—Chas. H. Yates, Chr.

1901. Nothing reported for the year.—Lewis S. Crosby, Sec.

No. 33 PLANTATION. 1900. We have had no contagious diseases this year. No improvements have been made. If we have a case of contagious disease reported, we look after the matter and disinfect the house infected thoroughly.—John R. Shuman, Sec.

1901. We have had no infectious diseases and our town has been quite healthy during the past year.—F. A. Avery, Sec.

OAKFIELD. 1900. Thus far we have had no work to do as there have been no contagious diseases reported in this town this year.—N. C. Martin, Sec.

1901. Fourteen cases of diphtheria, but none of scarlet fever or typhoid. Antitoxin was used in four cases of diphtheria with good results.—W. H. Gerrish, Sec.

OAKLAND. 1900. Five nuisances removed. Four cases each of typhoid and scarlet fever.

1901. Three nuisances reported; all removed. Two cases of typhoid, but no other infectious disease.—Dr. M. S. Holmes, H. O.

OLD ORCHARD. 1900. Thirty nuisances removed. Three cases of typhoid fever, but no other contagious diseases reported. We recommended the boiling of all drinking water during the drought of last year. All other work mainly routine.

1901. Twenty-nine nuisances reported and removed. Three cases of typhoid fever. Our main effort has been to extend our system of sewerage to accommodate the increasing number of cottages at the Beach. We have also been doing a thorough vaccination of the town.—Dr. J. A. Randall, H. O.

OLD TOWN. 1900. Thirteen nuisances reported; all have been removed. Two cases of diphtheria, sixteen of scarlet fever, and fifty of typhoid fever in the city and thirty-five in the hospital. We have extended the sewerage system.—H. M. Dickey, Sec.

ORIENT. 1900. One nuisance removed. One case of typhoid, but none of diphtheria or scarlet fever.—L. H. Dunning, Sec.

1901. No contagious diseases with the exception of one case of typhoid fever.—Daniel Maxell, Sec.

ORLAND. 1900. Two cases of typhoid fever.—Frank Buck, Sec.

1901. Three cases of typhoid fever reported to the board, but no other infectious disease.—Dr. R. H. Croxford, H. O.

ORNEVILLE. 1900. Two cases of typhoid fever, but none of diphtheria or scarlet fever.—J. S. Farnham, Sec.

1901. No cases of contagious disease with the exception of one case of typhoid fever.—John C. Boober, Sec.

ORONO. 1900. One nuisance removed. Two cases of scarlet fever.

1901. Five nuisances reported; all have been removed. Twelve cases of diphtheria and two of typhoid.—W. C. Taylor, Sec.

ORRINGTON. 1900. Nothing reported with the exception of eleven cases of scarlet fever and four of typhoid.—Dr. G. B. Tibbetts, Sec.

OTIS. Nothing reported for either year.—J. R. Grant, Sec.

OTISFIELD. One nuisance removed in each year. No cases of infectious disease except one of typhoid fever in 1901.—E. B. Jillson, Sec.

OXFORD. 1900. Six nuisances removed. Two cases of typhoid fever.

1901. Three nuisances reported, two of which were removed. Nine cases of scarlet fever, but no other contagious diseases reported.—W. L. Mont, Sec.

PALMYRA. No cases of infectious disease except three of scarlet fever in 1900. Our board has not made any changes in methods of work. The sanitary condition of our town is good.—G. W. Applebee, Sec.

PARIS. 1900. Three nuisances reported and removed. One case of diphtheria and four of typhoid fever.

1901. Three nuisances removed. Three cases of diphtheria and one of typhoid fever. In cases of diphtheria which were very mild, antitoxin was used resulting in recovery. Two cases of pulmonary tuberculosis were also reported, and in both, the directions given in Circular 54 were very carefully followed.—Horatio Woodbury, Sec.

PARKMAN. Three nuisances removed in 1901. No contagious diseases except two cases of scarlet fever in 1901. I look after all the best interests of the town in the health line.

I think the local boards can prevent a great deal of sickness by looking after it early in the spring. See that privy vaults are taken care of before hot weather.—N. M. Cobb, Sec.

PARSONSFIELD. Nothing reported for the two years.—Dr. F. G. Devereux, Sec.

PASSADUMKEAG. 1900. Six nuisances removed. Thirteen cases of scarlet fever in six houses. Formaldehyde disinfection was used.

1901. Five nuisances reported; all removed. One case of scarlet fever and one of measles reported, but no other infectious disease.—M. D. Beane, Sec.

PATTEN. 1900. Five nuisances reported, four of which have been removed. No contagious diseases with the exception of five cases of typhoid fever.

1901. Five nuisances reported; four removed. Two cases of typhoid fever.—John Jackman, Sec.

PEMBROKE. Nothing reported in either year with the exception of five cases of scarlet fever and one of typhoid in 1900; also nine of scarlet fever and five of typhoid in 1901.—Dr. J. C. Rogers, Sec.

PENOBSCOT. 1900. One case of scarlet fever and two of typhoid.—J. H. Littlefield, Sec.

1901. One nuisance removed. Two cases of typhoid fever. As far as possible, all who came in contact with persons having consumption, were notified of the dangers of infection and requested to take precautions. The sputum was either received on linen which was burned, or in cups containing solution of carbolic acid. There have been no outbreaks of contagious diseases during the past year. In consequence of the general good health which has prevailed, the local board of health has not been required to take any action to prevent the spread of any contagious disease and therefore have nothing to report in that line.—Dr. M. A. Wardwell, H. O.

PERHAM. 1900. One case of scarlet fever. It is difficult to get people in back places to respect the quarantine law, and keep from mingling with the public.—F. L. McIntire, Sec.

1901. No contagious diseases reported.—W. H. Braydon, Sec.

PERKINS. No changes or improvements have been made. This is a very healthy town, there having been no infectious diseases during the two years.—F. L. Call, Sec.

PERRY. 1900. Nothing reported for the year.—W. H. Lincoln, Chr.

1901. No nuisances reported to the board. No contagious diseases with the exception of two cases of scarlet fever.—H. I. Goulding, Sec.

PERU. 1900. No nuisances reported. No infectious diseases during the year.—S. F. Robinson, Sec.

1901. We have had two cases of scarlet fever reported to our board in the last year.—O. O. Tracy, Sec.

PHILLIPS. Nothing reported for either year except four cases of scarlet fever and one of typhoid in 1901.—Dr. E. B. Currier, Sec.

PHIPPSBURG. 1900. One nuisance reported and removed. One case of diphtheria, seven of scarlet fever, and one of typhoid fever. Formaldehyde is used for disinfection.

1901. One nuisance removed. No infectious diseases.—Dr. A. F. Williams, Sec.

PITTSFIELD. 1900. Three nuisances reported; all removed. Fifteen cases of typhoid and twenty-one of scarlet fever. In cases of pulmonary tuberculosis, the sputum is burned during sickness, and rooms disinfected after death with formalin solution, walls, ceiling, and floors washed and rooms newly papered and painted.

1901. Two nuisances removed by the board. No infectious diseases except seven cases of typhoid fever.—Dr. F. J. Taylor, H. O.

PITTSSTON. One nuisance removed in 1900. The last two years have been very healthy ones, there having been only one case of diphtheria in 1901 and a few cases of measles in 1900.—J. A. Kenney, Sec.

PLYMOUTH. Nothing reported for two years with the exception of six cases of scarlet fever in 1900 and two of typhoid fever in 1901.—Dr. E. P. Goodrich, H. O.

POLAND. 1900. One case of diphtheria, one of scarlet fever, and five of typhoid. Antitoxin was used in case of diphtheria with good results. We have watched carefully for all diseases that were in any way of a contagious nature and have done everything we could to allay any matter of suspicion.

1901. No nuisances reported to the board. Our town for the past year has been very fortunate in regard to contagious

diseases, none having come under our notice except one mild case of typhoid fever. The usual amount of disinfection was given with good results, and no results from former contagion reported. Our board has done everything to suppress contagion of every nature and are all well pleased with the results of our work.—Martin C. Davis, Sec.

PORTAGE LAKE PLANTATION. 1901. Nothing reported for the year.—O. Iverson, Sec.

PORTLAND. 1900. Two hundred and fifty nuisances reported, but only two hundred removed. Nine cases of smallpox, one hundred and eighteen of diphtheria, eighty of scarlet fever, and eighty of typhoid.—E. L. Dyer, Sec.

POWNA. We have had no infectious diseases for two years.—Dr. S. A. Vosmus, Sec.

PRESQUE ISLE. 1900. Five nuisances reported, three of which have been removed. One hundred cases of scarlet fever and five of typhoid. A dumping ground has been purchased by the town at the extreme town limits in a neglected swamp and well removed from any dwelling, and all refuse is drawn to this spot and burned. No other improvements worth mention have been made during the year.

1901. Twenty nuisances removed. Seven cases of diphtheria, one of typhoid, but none of scarlet fever. Antitoxin was used in three cases of diphtheria with good results. The other cases were so mild that it was not deemed necessary to use it. Have done nothing outside of our usual work during the past year.—Dr. W. F. McNamara, Sec.

PRINCETON. Nothing to report except one case of typhoid fever in 1901; also a severe epidemic of measles, about two hundred cases in all.—Dr. S. G. Spooner, Sec.

PROSPECT. 1900. Sixteen cases of scarlet fever and one of typhoid.—C. K. Harriman, Sec.

1901. We have had an unusually healthy year as there have been no contagious diseases reported, and we have not been called upon to do any work since our meeting.—C. H. Groce, Sec.

RANDOLPH. 1900. Seven nuisances reported; six removed. Three cases of diphtheria, but none of typhoid or scarlet fever. Dr. B. E. Lamb, Sec.

1901. Seven nuisances removed. Nine cases of diphtheria and one of scarlet fever.—H. S. Winslow, Chr.

RANGELEY. 1900. Two nuisances removed. One case of typhoid fever.—Geo. M. Esty, Chr.

1901. Five nuisances removed. One case of scarlet fever and one of typhoid.—Dr. F. B. Peabody, H. O.

RANGELEY PLANTATION. We have not made any changes during the past two years. Our town has been in a very healthy condition and we have not had any sickness whatever the last two years. We have been very careful to see that all privy vaults are disinfected and drains well cleared out, and also that drinking water is kept pure.—E. M. Gile, Sec.

RAYMOND. 1900. No nuisances reported. Three cases of diphtheria and four of scarlet fever, but none of typhoid.

1901. Twenty-one cases of diphtheria, but no other infectious diseases reported.—Geo. M. Leach, Sec.

READFIELD. 1900. One case of diphtheria and several of measles.—Dr. E. S. Hanaford.

REED PLANTATION. One nuisance removed in 1900 and three in 1901. Six cases of scarlet fever in 1901, but no other contagious diseases.—F. G. Pierce, Sec.

RICHMOND. 1900. Nine nuisances reported; six removed. Two cases of diphtheria and twelve of typhoid fever.

1901. Four cases of typhoid fever, but none of diphtheria or scarlet fever.—Dr. D. S. Richards, Sec.

RIPLEY. No nuisances reported in either year. One case of diphtheria in 1900; also one case in 1901 and two cases of typhoid fever in the same year. There were also a few cases of measles in 1900.—A. G. Farrar, Sec.

ROBBINSON. Three nuisances removed in 1900. No contagious diseases during the two years.—Frank R. Leach, Sec.

ROCKLAND. 1901. Twelve nuisances reported, ten of which have been removed. Three cases of diphtheria, four of scarlet fever, and one of typhoid. Antitoxin was used in one case of diphtheria with excellent results.—Dr. A. R. Smith, Sec.

ROCKPORT. 1900. Three nuisances removed. One case of typhoid fever. We have been very fortunate as regards contagious diseases during the past year. The one case of typhoid fever spoken of above was imported. No cases followed in family.

1901. One nuisance reported and removed. Seventeen cases of scarlet fever and ten of typhoid, but none of diphtheria. There has been no special work or improvements.—Dr. S. Y. Weidman, H. O.

ROME. 1900. Nothing reported for the year.—H. M. Hooper, Sec.

1901. Four cases of typhoid fever.—E. T. Foster, Sec.

ROQUE BLUFFS. No infectious diseases, except one case of typhoid fever in 1901, reported during the two years.—Geo. W. Schoppe, Sec.

ROXBURY. Two cases of typhoid fever were the only cases of infectious disease reported during the last two years.—A. W. Robbins, Sec.

RUMFORD. 1900. Five nuisances removed. Twelve cases of diphtheria, two of scarlet fever, and eighteen of typhoid. In every case of diphtheria, antitoxin was used with the best of results.

1901. Four nuisances reported and removed. Nine cases of diphtheria, eighteen of scarlet fever, and twenty-five of typhoid.—Dr. F. A. Porter, H. O.

SACO. 1900. One case of diphtheria, twenty-seven of scarlet fever, and twenty of typhoid fever. On account of the incompleteness of the records and data left by the late secretary, it is doubtful whether the foregoing is a correct statement.—Dr. J. D. Cochrane, H. O.

1901. Twenty-one nuisances reported; twenty removed. Three cases of diphtheria, twelve of scarlet fever, and seventeen of typhoid fever. Antitoxin was used in all cases with satisfactory results. A sewer has been built on the main street by request of the board of health.—Dr. J. D. Haley, H. O.

SALEM. 1900. One nuisance removed. One case of typhoid fever.—W. S. Lovejoy, Sec.

SANFORD. 1900. Seven nuisances reported; all have been removed. Eight cases of diphtheria, forty of scarlet fever, and nine of typhoid. Antitoxin was used in several cases of diphtheria with good results. When cases of pulmonary tuberculosis occur, physicians are requested to use proper precautions.

1901. No formal complaints have been made in regard to nuisances. Occasionally we have to tell the people to clean

out privy vaults. Twenty-four cases of scarlet fever and eight of typhoid fever. The large number of scarlet fever cases reported occurred in the winter. Two cases of measles have been reported and one case of cerebro-spinal meningitis which resulted fatally within forty-eight hours. Since May, 1900, our town has been practically free from contagious and infectious diseases. Our board ordered free vaccination and appointed two competent physicians to attend to the business. The results of the vaccinations, so far as heard from, have been very successful and satisfactory.—Geo. E. Allen, Sec.

SANGERVILLE. 1900. One nuisance removed. Two cases of diphtheria, five of scarlet fever, but none of typhoid. The outbreak of diphtheria was confined to one family. One patient died before antitoxin could be procured, but it was used with perfect success on the other case.

1901. Two nuisances reported and removed. No infectious diseases reported with the exception of three cases of scarlet fever. When cases of consumption occur, we give the people in the house instruction and furnish circulars on pulmonary tuberculosis.—Dr. C. W. Ray, Sec.

SCARBORO. 1900. Ten nuisances reported; all removed. One case of typhoid, but none of scarlet fever or diphtheria.—Dr. B. F. Wentworth, H. O.

SEARSMONT. 1901. One nuisance removed. No contagious diseases reported.—C. S. Adams, Sec.

SEARSPORT. 1900. Three nuisances reported and removed. No cases of infectious disease.

1901. Ten nuisances removed. One case of scarlet fever and two of typhoid.—Dr. H. H. Sellers, H. O.

SEBAGO. We have had no cases of contagious diseases with the exception of whooping-cough and mumps. We had the children of this town vaccinated at the town's expense in 1901.—Loren Bacheldor, Sec.

SEBEC. No infectious diseases reported except three cases of scarlet fever in 1900 and eight in 1901; also one case of typhoid fever in 1901.—Clarence Parker, Sec.

SEBOEIS PLANTATION. Nothing reported to the board in either year.—C. L. Smart, Sec.

SEDGWICK. 1900. No contagious diseases with the exception of three cases of typhoid fever.—J. N. Sargent, Sec.

1901. No nuisances reported to the board. One case of diphtheria and one of typhoid fever, but none of scarlet fever.—F. H. Harding, Sec.

SHAPLEIGH. Nothing reported for the two years except one case of typhoid fever in 1901. We offered free vaccination to the people of this town in 1901, but few have accepted it.—H. A. Stanley, Sec.

SHERMAN. 1900. One nuisance, a dangerous cesspool complained of, was promptly taken in hand by the selectmen and removed at quite an expense to the town. Private improvements are constantly being made voluntarily, which add much to the healthfulness of the town. By the public improvements, the sanitary condition of the town is being improved from year to year. During the three first quarters of the year, there was no contagious disease in town reported, and until the outbreak of German measles and scarlet fever, it was remarkably healthy, and we had but very little to do. Forty-three cases of scarlet fever in a very mild form were reported, but five of these properly belonged to a neighboring town.

1901. The work of the board has been on the same line as in the past. Private individuals endeavor to make their premises more healthful, and in many cases, what might have proved a nuisance if not cared for, is immediately attended to and abated without complaint being made or orders given by the board of health. Aside from the twenty cases of scarlet fever, nearly all of a mild form and no deaths resulting, it has been unusually healthy during the year.—L. C. Caldwell, Sec.

SHIRLEY. 1900. Two nuisances removed. Two cases of scarlet fever, but no other infectious disease.—W. W. Sawtelle, Sec.

SIDNEY. 1900. Two nuisances reported and removed. Two cases of scarlet fever and two of typhoid.—Dr. H. L. Johnson, H. O.

SILVER RIDGE PLANTATION. 1900. Generally speaking, a good state of health has prevailed during the past year. In the summer, the measles broke out. The board stopped the school and advised the people to use all means to prevent the spread of the disease. Every precaution has been taken to keep out infectious diseases.—G. H. Bowie, Sec.

1901. Nothing reported during the year.—G. A. Greaves, Sec.

SKOWHEGAN. 1900. Twenty nuisances removed. Three cases of scarlet fever and one of typhoid. Formaldehyde was used for disinfecting. One case of consumption was reported also, and a pamphlet of instructions was sent to the party.

1901. Six nuisances reported and removed. Three cases of scarlet fever and two of typhoid, but none of diphtheria.—Dr. W. S. Stinchfield, H. O.

SMITHFIELD. No cases of infectious disease during either year with the exception of one case of scarlet fever in 1901. There has been no work of any kind for the board to do.—W. M. Ellis, Sec.

SMYRNA. 1900. No contagious diseases reported.—A. B. Libby, Sec.

1901. The board has done no work for the past year only offering free vaccination for the town.—A. M. Leavitt, Sec.

SOLON. Nothing to report except six cases of scarlet fever in 1901. No improvements have been made during the two years.—S. F. Greene, Sec.

SOMERVILLE. This town has been unusually free from diseases of all kinds. There have been no infectious diseases during 1900 and 1901.—L. W. Soule, Sec.

SORRENTO. 1900. No contagious diseases.—J. W. Hall, Third Member.

1901. No infectious or contagious diseases reported to the board. There have been no improvements.—L. T. Harvey, Sec.

SOUTH BERWICK. 1900. Forty-seven nuisances removed. Ten cases of diphtheria and four of scarlet fever. Antitoxin was used in nearly all of the cases of diphtheria with good results.—Geo. F. Clough, Sec.

SOUTHPORT. 1900. One nuisance removed. No cases of infectious disease except two of typhoid fever.—Wm. Cameron, Sec.

SOUTH THOMASTON. 1900. No nuisances reported to the board. Two cases of diphtheria and twelve of scarlet fever.

1901. One case of typhoid fever, but none of diphtheria or scarlet fever.—Dr. Geo. C. Horn, Sec.

SPRINGFIELD. No contagious diseases reported for the two years except two cases of typhoid fever in 1900 and eight of scarlet fever in 1901.—Dr. P. H. Jones, Sec.

STACYVILLE PLANTATION. 1900. One nuisance removed. Two cases of scarlet fever and one of typhoid.—K. C. Woodard, Sec.

1901. There have been no cases of a contagious nature reported to the board this year.—C. Black, Sec.

STANDISH. 1900. No nuisances reported. Two cases of scarlet fever and two of typhoid, but none of diphtheria.

1901. No infectious diseases reported. There has been some improvement in the water supply. A number of drilled wells are added each year.—Dr. L. O. Buzzell, Sec.

STARKS. 1900. Measles has been the only contagious disease that has appeared in our town the past year.—A. G. Sawyer, Sec.

1901. One case of typhoid fever, but no other infectious disease.—C. D. Waugh, Sec.

STETSON. One nuisance removed in each year. No infectious diseases reported for the two years.—S. J. Ridlon, Sec.

STEUBEN. Nothing reported for either year except one case of scarlet fever in 1901.—G. W. Moore, Sec.

ST. AGATHA. 1900. Two cases of typhoid fever, but none of diphtheria or scarlet fever.—Dr. Isidore Coté, H. O.

ST. ALBANS. 1900. No nuisances reported. One case of scarlet fever.—Dr. J. H. Murphy, Sec.

1901. Five cases of scarlet fever and one of typhoid, but none of diphtheria. D. L. Frost, Sec.

ST. FRANCIS PLANTATION. 1900. Nothing reported for the year.—Xavier Cyr.

1901. This plantation has had no cases of contagious disease during the year.—David McKenzie, Sec.

ST. GEORGE. Only one case of contagious disease has been reported during the past two years, that being a case of typhoid fever in 1900. We have had two very healthy years in all respects. No improvements have been made in town. In cases of consumption, we have charged the patients to use the utmost care under advice of attending physicians.—Dr. F. O. Bartlett, Sec.

STOCKHOLM PLANTATION. 1900. No infectious diseases.—Alfred Tall, Sec.

STOCKTON SPRINGS. 1900. One nuisance reported and removed. No cases of contagious disease.—Dr. J. A. Pierce, H. O.

STONEHAM. 1901. Two nuisances removed. Nothing else reported for the board to do.—S. A. Stearns, Sec.

STONINGTON. 1900. Two nuisances reported; one removed. Eight cases of diphtheria, four of scarlet fever, and one of typhoid. Antitoxin was used in four of the diphtheria cases and worked like magic.

1901. Two nuisances removed. No cases of contagious disease reported.—A. T. Richardson, Sec.

STRONG. Nothing reported for either year with the exception of nineteen cases of scarlet fever in 1901.—Dr. Chas. W. Bell, Sec.

SULLIVAN. One nuisance removed in 1900. No infectious diseases reported for either year except four cases of typhoid fever in 1901. When cases of pulmonary tuberculosis occur, the suggestions of Circulars No. 54 and 70 are carried out as strictly as practicable.—Dr. F. W. Bridgham, Sec.

SUMNER. 1900. Two cases of typhoid fever.—Dr. E. H. Andrews, H. O.

1901. One case of diphtheria in which antitoxin was used with good results. Practically, there has been very little for the board to do in the line of contagious diseases during the past year. There has been more or less sickness in town but little contagion. We are inclined to the opinion that our citizens are more awake to the importance of sanitary measures than formerly. Being a rural town, abounding in rugged hillsides with scarcely any low marshy localities, the air and water are exceptionally good. We have several nonagenarians in town showing that the health conditions compare favorably with any rural town. While there has been little occasion for the active service of the board, yet its existence in an emergency is obvious. Fortunate is the town that has little for its board of health to do.—S. Robinson, Sec.

SURRY. 1900. One nuisance removed. No cases of infectious disease except one of typhoid fever.—H. J. Milliken, Sec.

1901. One nuisance reported and removed. Thirteen cases of scarlet fever and three of typhoid.—Dr. W. E. Emery, Sec.

SWAN'S ISLAND PLANTATION. 1900. Three cases of typhoid fever, but none of diphtheria or scarlet fever.—Dr. H. W. Small, H. O.

1901. Six nuisances reported; all have been removed. Seven cases of typhoid fever, but no other infectious disease reported

to the board. This island is a very healthy place.—Henry L. Conary, Sec.

SWANVILLE. No contagious diseases reported for either year with the exception of six cases of scarlet fever in 1900.—A. T. Nickerson, Sec.

SWEDEN. 1900. Nothing to report for the year.—C. W. Bennett, Sec.

1901. One nuisance removed. No cases of infectious disease.—A. S. Bailey, Sec.

TALMAGE. 1900. There was not a contagious disease in town during the past year.—F. R. Neal, Sec.

TEMPLE. There have been no cases of sickness during the last two years that have come under the jurisdiction of the board with the exception of ten cases of scarlatina in 1901.—H. L. Sampson, Sec.

THE FORKS PLANTATION. One nuisance removed in 1900 was all the work the board had to do for two years.—C. H. Young, Sec.

THOMASTON. One nuisance removed in 1900. One case of typhoid fever in 1900, and one in 1901.—Dr. J. Edwin Walker, H. O.

THORNDIKE. One nuisance reported and removed in 1901. No contagious diseases in either year.—Dr. B. P. Hurd, H. O.

TOPSFIELD. No cases of contagious diseases reported for the past two years.—John Kneeland, Sec.

TOPSHAM. 1900. Four nuisances removed. Six cases of diphtheria, nine of scarlet fever, and two of typhoid fever. Antitoxin was used in several cases of diphtheria and worked finely. We have had no public improvements. There have been a number of private improvements by our direction which we think in times to come, will be of benefit to the town.—James C. Purinton, Sec.

1901. Five nuisances reported; all removed. Two cases of diphtheria and one of scarlet fever.—Dr. H. O. Curtis, H. O.

TREMONT. 1900. Three cases of scarlet fever, but no other infectious disease.—E. B. Clark, Sec.

TRENTON. 1900. No contagious diseases reported.—John Smith, Sec.

TRESCOTT. No infectious diseases in either year with the exception of fifteen cases of typhoid fever in 1901.—John Saunders, Sec.

TROY. Nothing reported except one case of typhoid fever in 1900. No improvements made in either year.—Dr. M. T. Dodge, Sec.

TURNER. 1900. Two nuisances reported, one of which has been removed. Four cases of diphtheria, one of scarlet fever, and one of typhoid. Antitoxin was used in one case of diphtheria and was very successful.

1901. No nuisances reported. Two cases of diphtheria and one of scarlet fever.—J. P. Waterman, Sec.

UNION. 1900. Seven cases of scarlet fever in three houses.

1901. One nuisance removed. One case of scarlet fever and one of typhoid.—L. W. Hadley, Sec.

UNITY. Three cases of scarlet fever were the only cases of infectious disease during the year 1900.—Dr. C. M. Whitney, H. O.

UNITY PLANTATION. Nothing except four cases of scarlet fever reported for two years.—Wm. J. Getchell, Sec.

UPTON. No contagious diseases during the two years past except one case of typhoid fever in each year.—H. I. Abbott, Sec.

VAN BUREN. 1900. Eight cases of typhoid fever.

1901. One case of diphtheria and fifty-five of typhoid. Nothing has been done in the way of improvements.—Dr. H. H. Hammond, H. O.

VANCEBORO. 1900. We have had no sickness in our town this year. The board has not been called on to do any work in that time. There have been no improvements made, and, in my opinion, everything is in first-class condition.—Geo. W. Eales, Sec.

1901. Six cases of scarlet fever and one of typhoid. The chief matter of importance I have noticed, is the ease of controlling scarlet fever outbreaks when dealing with intelligent people and the ease with which same can spread under reverse conditions.—Dr. M. L. Young, H. O.

VASSALBORO. 1900. Four nuisances reported ; three removed. One case of diphtheria, five of scarlet fever, and three of typhoid. Formaldehyde was used for disinfecting. Some of the worst tenements at North Vassalboro have been entirely removed.—Edward H. Cook, Sec.

VEAZIE. 1900. Two nuisances removed by the board. No contagious diseases have been reported to this board this year.

1901. Three nuisances reported; one removed. Four cases of typhoid fever. We are pleased to say that our little town has been blessed with good health the past year.—Albert J. Spencer, Sec.

VERONA. No infectious diseases reported in town during the last two years except one case of diphtheria in 1901.—A. H. Whitmore, Sec.

VIENNA. Three nuisances reported and removed in 1900. One case of typhoid fever in 1900 and 1901 also. We arrange each spring for free vaccination.—E. N. Allen, Sec.

VINALHAVEN. 1900. Six nuisances removed. No infectious diseases.

1901. Thirteen nuisances reported; all have been removed. Six cases of typhoid fever.—Dr. E. H. Lyford, Sec.

WADE PLANTATION. 1901. There was nothing done by the board of health during the year.—Dr. L. Curtis, H. O.

WAITE. 1901. One case of typhoid fever, but none of diphtheria or scarlet fever.—J. C. Neale, Sec.

WALDO. 1900. Two cases of scarlet fever.—J. G. Harding, Sec.

1901. No cases of contagious disease.—C. W. Shorey, Sec.

WALDOBORO. 1900. Two nuisances removed. Three cases of scarlet fever and one of typhoid.

1901. Three nuisances removed. One case of typhoid fever.—Dr. G. H. Coombs, H. O.

WALES. 1900. No contagious diseases reported for the year.—W. A. Alexander, Sec.

WALLAGRASS PLANTATION. 1900. There has been only one case of diphtheria in the place this year.—Peter Saucia.

WALTHAM. 1901. I am glad to say that we have not had any infectious diseases the past year.—Alden K. Haslen, Sec.

WARREN. 1900. Three cases of diphtheria and two of typhoid fever. The board has had really nothing to do during the year. The people have always been ready to heed any suggestion made by the board in regard to wells and drainage; also disinfection and disposition of sputum from tubercular patients.—Dr. J. M. Wakefield, H. O.

WASHBURN. 1900. No nuisances reported to the board. Three cases of scarlet fever and three of typhoid. Our village has been quite healthy and the few cases of contagious diseases

have not spread, as we were careful in confining and attending to them, the parties themselves being anxious to keep the diseases from spreading.

1901. One nuisance removed. One case of scarlet fever and ten of typhoid. We had quite a number of typhoid cases this season in our village, generally light cases with no fatal results. Otherwise the sick list has been light. Our village is clean and householders are tidy about their outbuildings.—David L. Duncan, Sec.

WASHINGTON. 1900. Nothing reported to the board during the year.—Dr. S. P. Strickland, H. O.

1901. No contagious diseases reported. In cases of pulmonary tuberculosis, patients are warned not to expectorate on floor and to use pieces of paper or cloth which were burned.—Dr. J. W. Laughlin, H. O.

WATERBORO. 1900. Five cases of diphtheria. Antitoxin was used in four of the cases, resulting favorably in three. In the fourth, which proved fatal, it was not administered until an advanced stage of the disease.—B. L. Cluff, Sec.

1901. One nuisance abated. No cases of infectious disease. The townspeople are generally healthy.—Wm. A. Follette, Sec.

WATERFORD. Three cases of typhoid fever in 1900 and two in 1901. As we have had so few cases of contagious disease, our work has been very limited and devoid of interest.—Dr. A. B. Libby, H. O.

WATERVILLE. 1900. Seventy-six nuisances removed. Six cases of diphtheria, seven of scarlet fever, and fifteen of typhoid fever.

1901. Ninety-seven nuisances reported; all have been removed. One case of smallpox, nine of diphtheria, ten of scarlet fever, and fifty-five of typhoid fever.—Dr. L. G. Bunker, Sec.

WAYNE. One nuisance removed in 1901. No cases of infectious diseases except one of scarlet fever and two of typhoid in 1900.—Dr. F. L. Chenery, H. O.

WEBSTER. One nuisance removed in each year. One case of typhoid fever in 1900 and four of diphtheria in 1901 were all the contagious diseases during the two years.—James G. Jordan, Sec.

WEBSTER PLANTATION. We have had no cases of infectious diseases during the last two years.—A. A. Patch, Sec.

WELD. Two cases of typhoid fever in 1900 and one in 1901 were the only contagious diseases reported for two years.—W. H. Scammon, Sec.

WELLINGTON. 1900. There has not been one infectious disease reported to the board this year.—O. B. Davis, Sec.

1901. We have not had one case of contagious disease reported during the last year. It has been a very healthy year for our town.—Jos. Libby, Sec.

WESLEY. We have not had any infectious diseases to contend with the past two years and no work has been done by the board.—Samuel Hawkins, Sec.

WEST BATH. 1900. Nothing to report for the year except one case of typhoid fever.—C. W. Campbell, Chr.

1901. No cases of contagious disease.—Lincoln Williams, Sec.

WESTBROOK. 1900. Eight nuisances removed. Thirty-six cases of diphtheria, nine of scarlet fever, and eleven of typhoid fever. In nearly all cases of diphtheria antitoxin has been used and our physicians are highly pleased with results when applied in season. If the family is poor, we furnish the antitoxin at the expense of the city, as the sooner it is administered the more decisive its results.

1901. Eight nuisances reported and removed. Ten cases of diphtheria, thirty-four of scarlet fever, and twelve of typhoid fever. Our epidemic of scarlet fever originated in light cases where a physician was not called. Parents in some cases seemed disposed to conceal the appearance of the disease. Hence we had copies of the section of the law relative to the obligation to promptly notify the board of health, distributed. These were printed in French as the most of the cases occurred in French families. The convent schools became infected and were closed and the building disinfected.—H. K. Griggs, Sec.

WESTFIELD PLANTATION. 1900. One nuisance removed by the board. No infectious diseases reported. Our community is very healthful so the board has had little to do. We were visited by the measles in the spring, but there were no fatal cases.

1901. No nuisances reported. One case of scarlet fever, but none of diphtheria or typhoid fever. The board gave free vaccination to all who wished to take it.—Perry H. Smith, Sec.

WEST FORKS PLANTATION. 1900. No infectious or contagious diseases.—Frank J. Durgin, Sec.

WEST GARDINER. No cases of infectious disease for two years with the exception of one case of typhoid fever in 1900.—Wm. P. Haskell, Sec.

WESTMANLAND PLANTATION. 1900. Nothing has been done of any kind during the year.—J. H. Peterson, Sec.

1901. No contagious diseases reported to the board. We offered free vaccination during the year.—Emil Carlson, Sec.

WESTON. No infectious diseases in either year.—V. W. Putnam, Sec.

WHITEFIELD. 1900. One nuisance reported and removed. With the exception of three cases of scarlet fever, the people of this town have been remarkably free from all contagious diseases for the past year, no such disease having been reported, or come to our knowledge.

1901. The people of this place have been free from any infectious diseases during the last year, only four cases of diphtheria in a very mild form having come under our observation. The house wherein these cases occurred was quarantined and there was no spread of the disease. So little of contagious disease having occurred, in our town, the board of health has not been called upon to make improvements or changes in the methods of work, to any extent.—Marcellus Philbrick, Sec.

WHITING. 1900. One case of typhoid fever.—Willis H. Leighton, Sec.

1901. One case of typhoid fever, but no other infectious disease reported to the board.—J. H. Bell, Sec.

WHITNEVILLE. 1900. As soon as the frost is out of the ground in the spring, we see that every one cleans out his privy vault and cleans up around his buildings, so of late we have had but very little sickness, there being only one case of scarlet fever and two of measles during the past year.—W. M. Flynn, Sec.

1901. One nuisance removed. We have had no disease of a contagious nature during the past year. There have been no improvements of any kind except such as have been made by our highway commissioner who made several improvements in the drains in the village.—Chas. F. Bridges, Sec.

WILLIAMSBURG. Nothing to report for the two years.—R. J. Williams, Sec.

WILLIMANTIC. No contagious diseases during either year with the exception of one case of scarlet fever in 1900.—C. C. Norton, Sec.

WILTON. 1900. No nuisances reported. Two cases of diphtheria, two of scarlet fever, and six of typhoid fever. Antitoxin was used in both cases of diphtheria with good results.

1901. No cases of infectious disease reported.—Dr. A. B. Adams, Sec.

WINDHAM. No contagious diseases reported except five cases of diphtheria in 1900 in which antitoxin was used with most satisfactory results.—Dr. I. D. Harper, Sec.

WINDSOR. 1900. One nuisance removed. Six cases of diphtheria, eight of scarlet fever, and one of typhoid. Antitoxin was used in all cases of diphtheria with good results. Formaldehyde was used for disinfecting.

1901. Nothing reported to the board during the year in the way of infectious diseases.—C. F. Donnell, Sec.

WINN. 1900. Two nuisances removed. Four cases of scarlet fever.—P. J. Mulherin, Sec.

1901. One nuisance reported which was promptly removed. No cases of contagious disease.—J. R. Cromwell, Sec.

WINSLOW. 1900. Two nuisances reported and removed. One case of diphtheria which was very mild. A readiness on the part of owners of property and of tenants to improve conditions in regard to sanitary arrangements as suggested by the board of health has relieved the board of much unpleasantness and work that otherwise might have been necessary.

1901. Eleven nuisances removed by the board. One case of diphtheria, one of scarlet fever, and one of typhoid. Our freedom from contagious diseases we believe to be due to the precautions taken by the physicians and nurses, and thorough fumigation. In June, when smallpox broke out in Waterville, careful investigation proved that thirty persons in this town who had never been vaccinated had been fully exposed after case had become fully developed. All persons thus exposed were successfully vaccinated within three days, the result being that no smallpox occurred here.—Geo. W. Patterson, Sec.

WINTER HARBOR. 1900. Two nuisances reported; both removed. No infectious diseases. Sewer pipes have been

extended to low water mark instead of high water mark as formerly.—Dr. A. E. Small, H. O.

1901. Two nuisances reported and removed. Four cases of typhoid fever.—B. F. Sumner, Sec.

WINTERPORT. 1901. Nothing reported to the board.—T. H. Sproul, Sec.

WINTHROP. 1900. Two nuisances reported. One was removed by the board and the other by the parties themselves. One case of typhoid fever, but none of diphtheria or scarlet fever. Formaldehyde disinfection was used.—H. E. Foster, Sec.

WISCASSET. 1901. One nuisance removed. No cases of contagious disease.—Dr. L. C. Bickford, Sec.

WOODLAND. 1900. No nuisances reported. Thirteen cases of scarlet fever in five houses.—D. A. Snowman, Sec.

WOODSTOCK. 1900. One nuisance removed. One case of typhoid fever, one of consumption, several of measles, and one doubtful case of diphtheria.—Geo. L. Stephens, Sec.

1901. Two nuisances reported; one removed. One case of typhoid fever, but no other contagious disease.—Dr. G. W. Carroll, H. O.

WOODVILLE. 1900. The board has not been notified of any nuisances this year. No infectious diseases.—Nason Ingalls, Sec.

1901. Our town has been free from any contagious diseases during the last year.—Gorham Ireland, Sec.

YARMOUTH. 1900. Six nuisances reported; five removed, the other one partially so. Seven cases of diphtheria, two of scarlet fever, and four of typhoid. Antitoxin was used in every case of diphtheria, resulting in recovery.

1901. Five nuisances abated. Two cases of diphtheria, twenty-three of scarlet fever, and two of typhoid fever.—L. R. Cook, Sec.

YORK. 1900. Four nuisances reported; all removed. Four cases of scarlet fever and four of typhoid. Each case of typhoid was distant from all others by more than a mile. No traceable reason for three of them. The other was due to a foul sink drain and privy vault.

1901. One nuisance removed. Sixteen cases of scarlet fever and three of typhoid. Whenever any report is made of any

infectious disease, we compel a strict quarantine of all exposed persons. Everybody is satisfied so long as it is the other fellow who is quarantined. When it comes home, the case is usually different. We have several times been threatened with legal proceedings.—Dr. John C. Stewart, Sec.

SPECIAL PAPERS.



INFANT FEEDING.

Artificial Feeding.—The decision to nourish an infant in any other way than with breast milk brings serious dangers to the baby and is justified only by absolute necessity. Though the methods of artificial feeding now advised by physicians are better generally than those formerly in vogue, it has been impossible, and will undoubtedly remain impossible, to devise any substitute food which will be as suitable and safe a nutriment as the natural food of infants. That the period of infancy is fraught with special dangers is made evident by the statistics of mortality. In our own State during the nine years 1892-1900, for which records are available, 15,364 infants under one year of age died, or an average of more than 1,700 each year. During the same years, 5,006 infants died of cholera infantum and other diarrheal diseases of children. A great majority of these deaths occurred among bottle-fed babies, but just what the comparative death-rate of bottle-fed and breast-fed babies is, the registration of vital statistics in this country does not show. Dr. Boeckh, of Berlin, however, has collected a great number of valuable observations bearing upon this question. "He has, for several years, kept a careful record of each infant born in Berlin, with reference to the method of feeding during the first year of life. By this means he is enabled to arrange all infants in the city in groups, so that the dead of each class can be compared with the living of the same class; and these results have been published.

"The results were, briefly, as follows:

Mortality per 1,000 infants under one year old:		
Among those who were fed on the mother's milk only	7.4	per 1,000
Among those who were fed on mother's milk and cow's milk	21.4	"
Among those who were fed on cow's milk alone,	42.1	"
Among those who were fed on milk substitutes,	67.7	"
Among those who were fed on cow's milk and milk substitutes	125.7	"

"These figures are the result of a large number of observations (65,720 deaths), and may be considered as conclusive as to what is the best food for new-born infants."*

But aside from the excessive death-rate of bottle-fed babies, many of the survivors fail to develop into such perfect physical specimens of humanity as their heredity would lead us to look for, simply because their nutrition in childhood has been defective. This insufficient nutrition is due in part to a deficiency of the required food principles, and partly to the administration of these food elements in a form in which their digestion and absorption are difficult for the child.

It is well known to the husbandman that animals stunted in early months have but slight chance later to recover fully and to make as fine types of their species as those which have never suffered such temporary check in their growth. The greater difficulty in raising perfect specimens of animals by hand is also well known to stock breeders; but this task of the stock breeder is much less difficult, and much less likely to be unsuccessful than that of the mother, even the intelligent mother, who decides to bring up her baby on the bottle.

Disadvantages and Dangers in Feeding Cow's Milk.—The difficulties and dangers encountered in feeding cow's milk are of various kinds. Tuberculosis or other disease of the cow may be transmitted to the child through the medium of the milk. There should, therefore, be an assurance that the cows are healthy. Infectious diseases of dangerous kinds in the homes of the dairymen, are easily transmissible through the milk supply. Infectious persons should therefore not have anything to do with the milking, or with the subsequent care of the milk.

A still greater and more constant danger to the bottle-fed baby are various fermentative and putrefactive changes induced by bacteria which find their way into the milk from the udder, abdomen, and sides of the cow, from the hands or clothing of the milkers, from the dust of the stable, or from the utensils used in milking, caring for, and transporting the milk. The danger to bottle-fed babies from these sources are so real and great that the milk from the ordinary dairy which has no more than ordinarily intelligent care, cannot be considered suitable for infant feeding.

*Quoted from Dr. S. W. Abbott, Secretary of State Board of Health of Mass.

A third difficulty attending the use of cow's milk is that its quality is very often unfavorably affected by the injudicious feeding of the cow, unkind or thoughtless treatment of her, or by various disturbing influences to which she is subject. These dangers, and some previously indicated, can be avoided or mitigated in a great measure by using the milk of the whole herd of cows, which is always preferable in infant feeding to the milk from one cow.

But with milk from healthy cows, cared for with intelligence and with a desire to produce milk which is clean and suitable for infant feeding, the difficulties are not ended. The inherent difference between cow's milk and milk which nature has intended for the nourishment of the infant makes the problem of bottle feeding one which requires intelligent supervision to insure success. This inherent difference has been brought out very clearly by Dr. H. D. Chapin* in a new work just from the press. He says:

"While *chemical analyses* show all milks to be alike in containing the same ingredients, but in different proportions, milks differ in their behavior with rennet, and as chemical analyses give so little information as to the character of the milk, chemists classify milks according to their behavior with rennet. It is found that cow's, goat's, and sheep's milk form solid curds when acted upon by rennet, which even when broken up into fine particles will readily unite again; while horse's and ass' milk form a fluid jelly which will not become solid. Human milk seems to stand between these two types of milk.

"The greater part of the digestion of cows, goats, and sheep is performed in their stomachs, which, as stated before, comprise about seventy per cent of their whole digestive system. In changing the milk of these animals into a solid that cannot easily leave the stomach, the rennet causes the digestion of the young animal to take place in its stomach, the same as in the case of the parent.

"The stomach of the horse or ass, being only eight or nine per cent of the digestive tract, will not hold enough food for a meal, and the outlet to the intestine is large, so the food can easily leave the stomach, which it does continuously during a meal. The milk of the horse or ass does not form a solid lump,

*Theory and Practice of Infant Feeding. New York. 1902.

but a fluid jelly that can readily be forced into the intestine, which comprises ninety per cent of the digestive tract. Here again it is plain that the mother's milk is exactly suited physically to the digestive tract of the young animal, and that the process of digestion of the young animal is similar to that of the parent.

"In human beings, which eat meat and vegetable substances, the digestive system is adapted for either class of food, but the food must be prepared for digestion by thorough chewing of meat and by cooking of vegetable substances, as no paunch or enlarged intestine is furnished where they may lie and soak preparatory to digestion.

"The human stomach, which comprises about *twenty per cent* of the digestive tract, is provided with a small outlet to prevent lumps passing into the intestine. This small outlet, teeth for dividing every kind of food, and salivary glands that secrete more fluid than the kidneys, show that the stomach was intended to receive soft, finely divided material which could easily pass into the intestine. If any proof of this conclusion was needed, the distress that is often brought on by hasty eating and bolting great lumps of food would furnish it.

"Human milk does not form a solid lump or fluid jelly in the stomach, but a soft, finely divided mass.

"A whole book could be written showing instances of how nature adapts an animal to its surroundings and food, but from the few instances cited, which bear particularly on the feeding of young animals, it will be clear that, in physical properties at least, there are different kinds of milk and that these differences are not freaks of nature or inexplicable, but are of the highest importance *in developing the young animal's digestive system*; also that milks are not interchangeable from a digestive standpoint. These physiological comparisons throw a strong side light on the difficulties necessarily met with in utilizing the natural food of one species for the nutriment of another."

When circumstances unfortunately preclude natural feeding, the best and safest substitute by far in spite of its disadvantages is cow's milk, modified as nearly as may be to the need and the digestive capacity of the individual child. Of the hosts of other foods, often suggested or offered—patent infant's foods, condensed milk, the milk of other animals, etc.—none are so gen-

erally available, and so satisfactory and safe as fresh cow's milk properly prepared.

Cow's Milk vs. Breast Milk.—Chemically the principal differences are shown in the following:

TABLE NO. I.

	Fat.	Milk-sugar.	Proteids.	Reaction.
Breast milk	4%	7%	1%	Alkaline.
Cow's milk	4%	4.8%	4%	Acid.

This is the analysis of average human milk and of average cow's milk as given by Rotch, but the recent results obtained in the examination of milk indicate that the range of variation in normal milk is, at least, for breast milk, fat 3—5, sugar 6—7, proteids 1—2; and for cow's milk, fat 3—5, sugar 4—5, proteids 3.50—4.

Making a further comparison of cow's milk and human milk the following differences bearing upon the question of suitability for infant feeding are found:

The average results obtained in the analyses of the two kinds of milk show that the quantity of fat is practically the same in each, but the fat of mother's milk differs from that of cow's milk in containing fewer volatile acids; it is also in a much finer state of emulsion, and is therefore easier of digestion.

In cow's milk there is a much larger total quantity of proteids than in human milk and there is an essential difference in the character of the proteids in the two milks. In cow's milk a comparatively large percentage of the proteids consists of casein which in the digestive process coagulates into larger and harder curds than does that of human milk. In human milk on the other hand with a smaller percentage of casein there is a larger proportion of albumen not coagulated in the digestive process and readily assimilated.

In cow's milk the quantity of sugar is decidedly smaller than in mother's milk.

In cow's milk the reaction is amphoteric or slightly acid, while the infant at the breast receives a fluid which is neutral or faintly alkaline.

Cow's milk as ordinarily furnished for infant feeding contains a multitude of bacteria and the products of their activity.

The breast-fed infant receives a milk which is practically sterile.

In the mineral constituents the most important difference probably is that in mother's milk a large part of its phosphorus is in the more readily assimilable form of organic combination as casein, nucleon and lecithin while in cow's milk only the smaller part is in organic combination.

Milk Modification.—The marked differences in the chemical and physical composition of cow's milk and human milk and the disastrous results which usually follow the feeding of cow's milk in its unmodified condition make it plain that cow's milk, as an infant food must be modified so that it shall conform as closely as possible to human milk in digestibility, ease of assimilation, and nutritive value. How this may be done and a fuller consideration of the reasons for the various steps in the process will now be given.

Proteids.—The chief obstacle to success in the artificial feeding of infants is the comparative indigestibility of the casein of cow's milk. The casein of cow's milk is not only in greater quantity, but it coagulates in harder, tougher masses. The first problem in the modification of milk is the diminution of the quantity of this coagulable proteid, and in the feeding of infants during their first few weeks or months of life, it is exceedingly important that the casein content be kept low enough to avoid the dangers of digestive disturbances, which once started, seriously, and often for a long while, complicate the difficulty. While the total proteid content of breast milk is between one and two per cent, it is never safe to administer to very young babies, cow's milk which has been diluted only to a corresponding proteid percentage. On this point Rotch* has said:

"It may, perhaps, be of some significance also to state that in making a careful analysis of 164 fully recorded cases treated at the Boston Walker-Gordon Laboratory, I have found a decided reduction in the percentages employed, amounting to at least fifteen per cent during the last two years, in comparison with the high percentages used in the previous two years, and that during the same two years here in New York the same reduction has been found in the prescriptions sent to the laboratory by the New York physicians. That is, we are learning that low percentages, if carefully adjusted, produce better results than begin-

* Medical News, LXX., 420. 1897.

ning with high ones. I have also found, somewhat to my surprise, that a critical review of my own prescriptions shows that my tendency has been to increase the proteid percentage much more slowly than in former years, and that I arrive at the percentage of 4, which is that of cow's milk, rather after the twelfth month than at or before that age of the infant. In private practice also the rule has been that in summer the most successful treatment of diarrheal cases has been with low percentages of all the elements of the milk, the average percentages being: Fat, 1.50 to 2.50; sugar, 4.50 to 5.50; proteids, 0.25 to 0.67."

Against the practice of rapidly increasing the percentage of proteids with the advance of the period of artificial feeding, seem to be the results obtained in the later and probably more trustworthy analyses of mother's milk. With the increasing wants of the infant, there is furnished an increased quantity of mother's milk as the period of lactation advances, but there is no increase in the proteid percentage. On the contrary after the first few weeks, there is a fairly constant proteid content during the rest of the period of lactation, or a slight diminution in the last few months of it. This is shown in the following proteid column which is derived from a statement of the thorough work of John and Vanderpoel Adriance of New York in determining the composition of breast milk.

	Per cent.
Second to seventh day.....	2.77-1.90
Eighth to fourteenth day.....	1.87-1.70
Three weeks	1.62
One month	1.58
Two months	1.55
Three months	1.48
Four months	1.40
Five months	1.32
Six months	1.25
Seven months	1.18
Eight months	1.11
Nine months	1.04
Ten months .....	.97
Eleven months .....	.90
Twelve months .....	.83

	Per cent.
Thirteen months .....	.77
Fourteen months .....	.70
Fifteen months .....	.63

Schlossmann, Pfeiffer, and Richmond confirm the statement that, in mother's milk, there is a gradual decrease in the proportion of proteids, while a still greater diminution in the proteids of breast milk is shown in the average of the results of the analyses made by Soldner and Camerer and Carter, viz: First week, 2.0; second week, 1.6; third week, 1.4; fourth week, 1.3; second month, 1.2; third month, 1.1; fourth month, 1.0; fifth month, 0.9; sixth month, 0.8. Commenting on these results, Zahorsky* says:

"All this goes to show that we have regarded the proteids too high, and it is probable that this great excess of proteids given in artificially fed babies has wrought mischief. Schlossmann has given strong argumentative facts for the support of the view that babies at the fourth to eighth month fed on high proteids show the greatest mortality. In another place I have reported deaths from thermic fever, all of which occurred in babies who took about 4 per cent proteids."

This may all serve as a warning against the common practice of increasing too rapidly the proteid percentages for bottle-fed babies.

Albumen.—While the difficulty which the infant encounters in the digestion of the casein of cow's milk, requires a low percentage of it in artificial feeding, the other principal constituent of the proteids, albumen, uncoagulated in the process of infantile digestion, is readily absorbed and assimilated. Efforts have therefore been made in some methods of feeding to retain the full normal percentage of milk albumen or to increase it while effecting a diminution of the casein. These will be mentioned under "Whey and Whey Mixtures."

While modifying cow's milk to adapt it to the digestive capacity of the individual child, and while it may sometimes be necessary to reduce temporarily the proteid percentage to an extremely low figure, it must be remembered that this food element is an indispensable constituent of food mixtures, and is an essential in the structure of every cell in the organism of the growing child.

* *Pediatrics*, V., 531. 1898.

Fat.—The percentage of fat in cow's milk in the form of cream corresponds so nearly with that of human milk that it may be considered the same—about 4 per cent. Fat is needed in the infant economy for both nutrition and for the development of heat. It also aids in the digestion of the proteids and in the regulation of the intestinal peristalsis. Some claim that rickets is often due to fat starvation.

Nevertheless with bottle-fed babies there is need of an intelligent limitation of the fat percentage. Next to the proteids, the fat of cow's milk gives the most trouble in artificial feeding. The fat of human milk differs markedly from that of the cow, notably by a higher refractive index, which seems to show a higher molecular weight. The fat of cow's milk is more difficult of digestion. As a general statement it may be said that success in artificial feeding requires a smaller percentage of fat than is found in average breast milk.

"In deciding, then, what percentage of fat must be given in the infant's food, we must bear in mind that moderate rather than high percentages usually give the best results. Two per cent of fat may safely be administered to the newborn child, and the percentage may be soon increased to three, provided the infant is healthy and has a vigorous digestion. During the first four or five months of the child's life it is rarely necessary to reduce the percentage of fat below two, and rarely advisable to exceed the limit of three and a half. In some cases it is permissible to increase the proportion of fat to four per cent during the second half of the first year; for the great majority of infants, however, the limit of three and a half per cent of fat had best not be exceeded until the child is put on a diet of whole milk."*

Sugar.—Sugar is the third of the three chief food principles found in milk. It is needed as a source of heat and vital energy. While cow's milk, compared with human milk, has a much larger percentage of proteids, it has a smaller proportion of sugar. In the dilution of cow's milk required to bring its proteid percentage down to the digestive capacity of the infant, its sugar content is attenuated far below what it should be. We must therefore bring up the percentage of sugar in milk modification so that it will be somewhere near the six or seven per cent

* Judson and Gittings—*Infant Feeding*. Philadelphia. 1902.

found in human milk. The only question here is what kind of sugar shall be added, and this is one over which specialists of equal eminence have differed. "Reasoning from analogy," says Rotch,* "we should say that as milk-sugar is the only kind of sugar found in the milk of mammals, it is there for some good purpose. Both cane-sugar and milk-sugar are converted into glucose in the intestines. The *bacillus lactis aerogenes* is present in normal digestion, and acts on the milk-sugar to produce an organic acid which drives out the more noxious forms of bacteria. When milk sugar is converted into glucose, we physiologically have a gradual conversion into lactic acid, which may aid in the digestion of the albuminoids, thus giving us a very valuable addition to the means at our command for rendering modified cow's milk digestible."

Against the objection to the use of cane-sugar that it is a foreign substance as a constituent of milk-food, has been replied that the sugar derived from cow's milk is equally foreign when added to infant foods.

The sugar of human milk has a specific rotatory power of 48.7 degrees, while that of anhydrous lactose is 55.3. Human milk sugar crystallizes in rhomboid plates; lactose in wedge-shaped crystals. By oxidation with nitric acid, more mucic acid is formed than can be given by an equal weight of lactose. Then human milk sugar is less sweet than that of cow's milk. Carter concludes that the sugars are not the same in the two milks, and from differences obtained by the polariscope, Fehling's test, the differential method, and certain chemical tests, he believes there are two sugars in human milk, a crystalline aldobiase and an amorphous substance.†

For many years Jacobi has strongly urged the use of cane sugar instead of milk sugar in infant feeding. He claims that the antifermentative action of lactic acid displayed during the putrefaction of albuminoids is shared by other sugars and by starch, and Miura has proved that the small intestines of the fœtus and new-born contain an inverting ferment which renders possible the absorption of cane sugar. To repeat, a milk mixture which contains twenty-five per cent of milk will furnish enough milk sugar for the purposes of lactic acid production and of digestion.‡

* Pediatrics. Philadelphia. 1896.

† Dr. Zahorsky. Pediatrics, V., 530. 1898.

‡ Quoted from Judson and Gittings.

Dr. E. F. Brush* says that one of the faults of physiological chemists is, that they make no distinction between a substance existing in a natural condition and that substance eliminated and isolated by chemical means. Thus, the sugar of milk of commerce and the sugar of milk as it exists in that fluid are regarded by the chemist as one and the same thing. Hence, the physician has been led into the error of thinking that as the sugar in milk is that designed by nature as the best saccharine nutrient, therefore the isolated sugar must fulfill the same function. This is not the truth. Sugar of milk in that fluid is all assimilated, and the milk sugar of commerce when added to baby food is eliminated both by the kidneys and bowels. This, I have demonstrated by numerous experiments. I have never found sugar present in the urine or fæces of babies fed at the breast, but in three cases of infants fed with mixtures containing commercial milk sugar to the amount of three ounces or more in twenty-four hours (as in Meigs' mixture) I have always found sugar in the urine and fæces demonstrated by Fehling's test. Therefore instead of being of value as a nutrient it must be harmful, to what extent, I am not at present prepared to say. A substance that is not broken up in the system but eliminated without change, if it be not an absolute poison will produce little if any appreciable immediate effect. Describing the methods of its manufacture Dr. Brush indicates the danger of serious chemical and bacteriological contamination of commercial sugar of milk.

In line with others who have successfully substituted cane sugar for milk sugar, Dr. Perry† said, a few years ago, that three years ago cane sugar, which costs about six cents a pound, was substituted for milk sugar at forty cents, in the food of the babies at the Massachusetts Infant Asylum, without causing any appreciable disturbance in their digestion and at an annual saving of one hundred dollars a year to the institution.

In the choice of a sugar for use in infant food it would seem to be a good rule to use milk sugar only when an undoubtedly pure article can be obtained and the necessarily high price for it can be afforded, otherwise to use crystallized cane or beet sugar.

* "Milk." New York and Albany. 1898.

† Boston Medical and Surgical Journal, CXXXIV., 631. 1896.

Mineral Matter.—Compared with human milk, cow's milk contains an excess of salts, but it is deficient in some substances which are supposed to have a high nutritional value for the infant.

"Siegfried and his pupil, Wilmaack, have found 1.1 to 1.3 grammes of nucleon in a liter of human milk; cow's milk contains only 0.6 gm. per liter. Of the total phosphorus of cow's milk six per cent is contained in the nucleon, while in human milk it is 41.5 per cent. In fact they state that nearly all the phosphorus in human milk is in organic combination."*

"In woman's milk a portion of the lime is united to the casein; the rest is combined with phosphoric acid as a mixture of di- and tri-calcium phosphates, which are kept soluble and held in suspension by the casein. The phosphorus in woman's milk consists mainly of casein-phosphorus, nucleon, and lecithin; it is nearly all held in organic combination, whereas in cow's milk less than half of the phosphorus is in organic combination. Nucleon is the richest in phosphorus of the organic compounds in milk."

"While cow's milk is richer than mother's milk in phosphorus, only the smaller part of it is in organic combination in the former case. The remainder is present as inorganic phosphates. In woman's milk, on the other hand, all the phosphorus is in organic combination: according to Schlossmann, thirty-five per cent in the casein, thirty-five per cent in the nucleon, and thirty per cent in the lecithin, as against thirty-five per cent in the casein, eleven per cent in the nucleon and lecithin, and fifty-four per cent in inorganic combination in cow's milk. Since the casein contains phosphorus, it may be considered a nucleo-albumen; but whereas the nuclein contained in it is not absorbable as such, nucleon and also lecithin are very easy of absorption. The organic phosphorus combinations are much more important for the nourishment and growth of the infant than the inorganic."†

"Up to the present we have found no means of compensating for the greater richness of mother's milk in nucleon and lecithin, which increases as the secretion of milk becomes more abundant. We know also that boiling destroys the lecithin (Baginsky), and if the application of heat is prolonged, also the nucleon; the

* *Pediatrics*, V., 592. 1898.

† Edlefson. Quoted from Judson and Gitting.

nuclein of the casein is probably also modified. These facts perhaps explain why infants fed for a long time on milk and milk preparations which have been subjected for a considerable period of time to excessive heat sometimes develop scurvy. The beneficial results from the administration of phosphorus and cod-liver oil in rickets make it probable that this disease is due, in great measure at least, to an insufficient amount of organic phosphorus in the food.*

Alkalinity.—It has been customary to neutralize the slight acidity of cow's milk by the addition of lime water or other alkali, but there is not a complete unanimity as to the need of this. "It is to be questioned," says Jacobi, "how much can be effected by the addition of lime water in five per cent strength (as commonly advised). At 59° F. it contains 0.17 per cent of lime, in rising temperatures less, and at the boiling point 0.13 per cent. An experiment with good cow's milk showed that lime water failed to overcome acidity.

"To render milk distinctly alkaline with sodium bicarbonate may be a grave error. The very bacilli which, with their spores, resist boiling to an unusual degree thrive best in an alkaline milk."

At the request of Rotch, Dr. Harrington made some experiments with lime water and ordinary cow's milk twenty-four hours old. It was found that as small an amount as one-sixteenth part, when added to ordinary milk, will render it alkaline, so that for making an acid milk correspond in its reaction to woman's milk, lime water is of great value, as it apparently does not produce any other changes in the milk. In addition to this, the taste of the mixture which is made from ordinary cow's milk so as to correspond to the composition of woman's milk, is strikingly like that of woman's milk if it contain one-sixteenth part of lime water.†

The need of the addition of lime water to milk has probably been overestimated. The acidity of cow's milk when freshly drawn has been more apparent than real. The addition of lime water merely retards the peptic coagulation of milk until its alkalinity is neutralized. Lime water appears to be beneficial when litmus paper indicates acidity, or when there is vomiting.

* Judson and Gittings—*Infant Feeding*. Philadelphia. 1902.

† *Pediatrics*. Philadelphia. 1896.

The experiments of Dr. F. W. White* indicate that lime water has no effect upon the character of the curd, and that for rendering the curd softer and more flocculent, dilute solutions of starch are far superior.

Lime Water.—It can be prepared in any household by placing a piece of unslaked lime the size of an egg in one gallon of water in an earthen vessel. Stir and let settle. Pour off the first water and add fresh. Keep covered to exclude the dust. Use from the top, being careful that the lime beneath is not disturbed and that the lime water poured off is perfectly clear. To replenish the supply add water, stir and let settle as before.

Lime water should not be added to preparations of milk which are to be sterilized. When that is done the heating causes a precipitation of the lime, and the lime enters into combination with the sugar producing a brownish color.

When the milk mixture is to be sterilized, the acidity of the milk may be neutralized by using a solution of sodium bicarbonate, one dram to the quart. This has the same degree of alkalinity as lime water. The quantity of either ordinarily added to milk mixtures is five per cent, or one ounce in twenty.

Raw Milk vs. Heated Milk.—That the "heated term" in every year is a trying and a dangerous time for the little ones is well known. Of the babies who died from infantile diarrhea in 1900, for instance, 500 died in the three months July, August, and September, which constitute the third quarter of the year, while in the first, second and fourth quarters there were, respectively, only 28, 35 and 117 deaths from this cause. Now the heat directly plays, perhaps, a minor part in this death-rate, but it is generally conceded that the main cause is the poisons which are generated in the milk of bottle-fed babies, before and after feeding, by the rapid development of the bacteria that happen to gain access to the milk. With the full comprehension of this, there was a general turning to sterilization with heat as a means of obviating this danger, and the statistics in New York and some of our other cities seem to show that this precautionary measure has been the means of saving many infant lives.

But milk boiled, or subjected to a somewhat lower temperature long enough, undergoes, aside from the diminution of the number of bacteria in it, some other changes affecting its

* Jr of Boston Soc. of Med. Sc. V., 125. 1900.

physical, chemical, and nutritive properties. The full significance of these changes with reference to infant feeding is not fully known now after much investigation and still more discussion of the matter.

The following are some of the statements which have been made relative to the changes which result from the sterilization of milk.

Heat produces in milk chemical changes so that the reaction of the stomach acid and the lactic ferment on the casein is incomplete, and consequently, an excessive residue of the milk proteids remain unassimilated.

Milk sugar is partly changed or destroyed at elevated temperatures.

The fat emulsion is rendered less complete by the coalescence of the fat globules.

At 67° F. separation of the albumin begins and increases as the temperature is raised.

The cooking of the milk produces objectionable changes in its taste.

Normal lactic acid fermentation is prevented, thereby favoring the development of the casein ferments.

Heat destroys certain ferment-like bodies which, when absorbed, are probably of distinct value to the organism.

Heat destroys trypsin, which, as a constituent of milk, aids in the digestion of it.

Nucleon, nuclein, and lecithin are destroyed and their phosphorus which was in organic combination in them is precipitated. There is therefore a diminution of the organic phosphorus and an increase of inorganic phosphorus.

Some of the calcium salts, normally soluble, become insoluble.

Many physicians believe the changes which sterilized milk has undergone seriously injures its nutritive value and renders its digestion more difficult. A collective investigation made a few years ago, and other evidence, show that the use of sterilized milk in infant feeding has, in many instances, been followed by scurvy, rickets, or other disorders of nutrition. On the other hand, it is maintained that the digestion of sterilized milk is less difficult than that of raw milk and that the cases of scurvy and rickets have not by any means followed exclusively the use of sterilized milk, and that, if it is shown that sterilization is some-

times the cause of these diseases it is the choice of the lesser danger when compared with the greater one of gastric and intestinal disturbances.

Illustrating some of the views which are adverse to feeding infants on sterilized milk is, first, that of Dr. Brush.*

"The natural food for the human young comes from the female breasts; this is a living, vitalized food. . . . Thus it will be seen that Nature has abundant resources to supply vitalized food for the young, and it would seem from all the plain teaching of Dame Nature that the prime necessary quality of food for the young is *vitality*. Contrary to this is the enthusiastic endeavor of the antibacteriologist to thoroughly devitalize all the food prepared for the baby. In the present state of society it seems inevitably necessary to endeavor to pass some of the young through babyhood by the use of artificial foods. Of all the artificial foods easily procured and abundantly supplied, the milk of the dairy cow is universally admitted to be the best. Unfortunately, however, the cow is a delicate animal, subject to many diseases that affect the milk perniciously, and her keeper is careless, often allowing the milk to become contaminated from many sources. The proper sterilization of cows' milk, when used for infant food, without doubt eliminates or neutralizes many of these disturbing influences, and the work of Dr. Soxhlet, Dr. Caillé, and others, has been, without doubt, of great value during the present condition of the dairies and the milk supplied to large cities.

"But the apparent satisfaction that has taken possession of many at the idea of sterilization as having solved the problem of infant feeding, may possibly delay the absolutely necessary reform that is required in the dairy itself. Cows that are perfectly healthy, receiving proper food and care, supply a milk, which, if properly guarded, retains much of its vitality for several hours, and is absolutely the best artificial nourishment for the human young. Sterilizing milk obtained under these conditions robs it undoubtedly of much of its nutritive value."

Again, the same idea is expressed by Dr. J. L. Kerr,† of England:

* "Milk." New York and Albany. 1898.

† British Medical Journal. Quoted by Dr. Fischer.

"Milk consists of a multitude of cells suspended in serum. The cells are fat-cells, which form the cream; the remaining cells are nucleated, and of the nature of white blood-corpuscles. The serum consists of water, in which is dissolved milk-sugar and serum-albumin, with various salts, and, chief of all, casein. The cells, with the exception of the fat-corpuscles, are all *living cells*, and they retain their vitality for a considerable time after the milk is drawn from the mammary gland.

"There is reason for supposing that when fresh milk is ingested, the *living cells* are at once absorbed without any process of digestion, and enter the blood-stream and are utilized in building up the tissues. The casein of the milk is digested in the usual way of other albuminoids by the gastric juice, and absorbed as peptone. There is also absorption of serum-albumin by osmosis. The chemical result of boiling milk is to kill all the living cells and to coagulate all the albuminoid constituents. Milk after boiling is thicker than it was before.

"The physiological results are that all the constituents of the milk must be digested before it can be absorbed into the system; therefore there is distinct loss of utility in the milk, because the living cells of fresh milk do not enter into the circulation direct as living protoplasm, and build up the tissues direct, as they would do in fresh, unboiled milk. In practice it will have been noticed by most medical practitioners that there is a very distinctly appreciable lowered vitality in infants which are fed on boiled milk. The process of absorption is more *delayed and the quantity of milk* required is distinctly *larger* for the same amount of growth and nourishment of the child than is the case when fresh milk is used."

Against these objections to the sterilization of milk may be set the opinion of Jacobi that "only one great progress has been made in infant feeding these dozens of years, namely, the more or less universal introduction of the practice of heating cow's milk and all other substances employed in infant feeding," and again: "As long as cows are tubercular, and milk is exposed to contagion from scarlet fever, diphtheria, typhoid fever, etc., as ordinarily obtained it needs to be boiled." *

A not too restricted survey of the pediatric literature of the last few years should convince one that the prevailing opinion is

* Judson and Gittings. *Infant Feeding*. 1902.

that, until there are distinct improvements in the quality of the milk supply, the heating of milk for infant feeding is a necessary evil. The chief difference of opinion relates to the temperature to which the milk should be subjected, and other details of the process.

Pasteurization.—The extent of the undesirable changes which milk undergoes when heated depends upon the degree of heat employed and its duration. There has therefore been an earnest effort by many investigators to determine the minimum degrees of temperature which suffice to free milk from those bacteria which cause infectious diseases or harmful changes in milk or greatly to reduce their number. The following observations and opinions are helpful in determining this point:

Eitter* concludes that the tubercle bacillus, the most resistant of the pathogenic germs likely to be found in milk, is killed in 30 minutes at the temperature of 155° F.

Professor Forster, at that time connected with the University of Amsterdam, determined the thermal death-point of the tubercle bacillus to be

149° F. for 30 minutes.

155° F. for 15 minutes.

167° F. for 10 minutes.

Later De Man,† in the laboratory of Professor Forster, carried out a careful series of experiments which showed him that the bacillus of tuberculosis is destroyed

in fifteen minutes at the temperature of 149° F.

in ten minutes at the temperature of 158° F.

in five minutes at the temperature of 176° F.

In experiments in heating milk to from 113° to 158° F. for 20 minutes, Farrington and Russell learned that over 99 per cent. of the bacteria‡ were destroyed. While the average unpasteurized milk remained sweet about two days, milk pasteurized at 155° F. for 15 minutes and at 140° for 15 and 30 minutes kept over six days.

In earlier work Russell§ concluded that 149° F. for 30 minutes, or 155° F. for 15 minutes, or 167° F. for 10 minutes suffices to destroy the tubercle bacillus.

* *Zeitschrift für Hygiene*, VIII., 255. 1890.

† *Archiv für Hygiene*, XVIII., 133. 1893.

‡ *Experiment Station Record*, XII., 84. 1900.

§ *Bul. No. 44, Agric. Exper. St. of Wis.*, p. 11. 1895.

Another experiment station worker, Marshall,* of Michigan, inoculated 13 guinea pigs with milk which had been kept at the temperature of 155° F. for 20 minutes, while 5 other guinea pigs as controls were inoculated with some of the same milk not heated. He states the results as follows: "Every one of the controls died in the advanced stages of tuberculosis, while not one of those receiving the pasteurized milk, even in quantities five times as great, showed any traces of tuberculosis."

At the Maryland Agricultural Experiment Station the pasteurization of milk at 140° F. for thirty minutes gave rather better results than 167° F. for 10 minutes. The percentage of germs killed was 99.2 per cent. and 98.8 per cent. respectively, but the milk pasteurized at 140° F. had, before pasteurization, a much greater number of bacteria, due to a warmer season of the year and not cooling the milk after it had been drawn.†

Dr. Theobald Smith‡ learned from his experiments that tubercle bacilli suspended in milk are destroyed at 140° F. in fifteen to twenty minutes, but that, unless the milk is stirred or agitated during its heating the pellicle which forms upon its surface may contain living bacilli even after sixty minutes exposure.

For the pasteurization of milk Holt§ recommends the temperature of 167° F. for twenty minutes. This temperature does not alter the taste of the milk, it keeps two or three days at room temperatures, and the bacilli of cholera, typhoid, diphtheria, tuberculosis, coli communis, and all other pathogenic germs are destroyed.

Monti prefers to heat milk only to 140° or 158° F. for ten minutes and then quickly cool down to 42° F. and keep at or near that temperature until it is used.

Dr. Dessau§§ advises exposing the milk ten minutes to a gradual rise from 140° to 160° F. in a closed vessel. This does not coagulate the albumin and nucleins, nor decompose the fats, nor render the calcium salts insoluble, but it does destroy 99 per cent. of the vegetating germs and renders the curd finer and more easily digestible.

For some years Dr. Freeman** has made an effective plea for the pasteurization of milk at 155° F., for thirty minutes, followed

* Bul. No. 173, Mich. Agric. Exp. Station, p. 316. 1899.

† Bul. No. 77, Md. Agric. Exper. St. 1901.

‡ The Journal of Experimental Medicine, IV., 217. 1899.

§ Diseases of Children, 2d Edition. New York. 1902.

§§ Pediatrics, XIII., 84. 1902.

** Archives of Pediatrics, XV., 509. 1898.

by rapid cooling as the best temperature exposure. "Such a temperature will destroy the germs of diphtheria, typhoid fever and tuberculosis, and so many of the other germs present that a plate planted from milk so treated and kept at a laboratory temperature will usually show no growth in twenty-four hours. At the same time this milk has not been heated sufficiently to give it a "cooked milk" taste or to change its taste at all, and the temperature to which it has been exposed is more than ten degrees centigrade below that at which the chemical changes in milk due to heating are said to take place."

This examination of the results of somewhat recent experimental work and of the opinions of those who are qualified to speak on this point, appears to warrant the conclusion that it is safe to choose a somewhat lower temperature than seemed justifiable a few years ago and that ordinarily fresh milk kept twenty minutes at the temperature of 155° to 160° F. and then cooled immediately to the temperature of 45° F. and kept near that temperature until it is used has escaped the undesirable changes which milk heated to a higher temperature undergoes, and has been freed from pathogenic organisms and those milk bacteria which are the most prolific cause of trouble. Such treatment does not, however, destroy the butyric acid and peptonizing bacteria but so long as the milk is kept on ice their development is prevented.

Method of Pasteurizing.—The pasteurization of milk should consist we will say, in heating it to 155° or 160° F. and keeping it at that temperature a sufficient length of time, and then cooling quickly by means of ice to about 45° F. The rapid cooling is an essential part of the process.

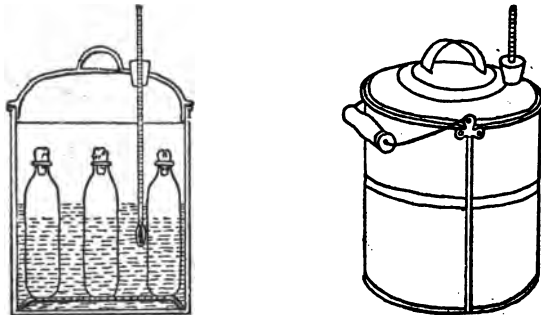


FIG. 1.

The milk mixture to be sterilized, filled into bottles or tubes, one meal in a bottle, and stoppered with cotton, is placed in the pasteurizer. The pasteurizer, Fig. 1,† consists of a tin pail and cover fitted up with a rack which has spaces for the required number of bottles. The pasteurizer is filled with water to a height corresponding with the height of the milk in the bottles, and the water is heated to 160° F. The pail is then removed from the fire, wrapped with a clean piece of blanket or covered with a cozy made especially for the purpose, and kept in a warm place half an hour. Cool the bottles gradually at first and then keep them on ice.

Diluent—The Cereal Question.—For many years the question what shall be used as the diluting agent in preparing cow's milk as infant food has been a lively one. The chief controversial point has been whether water properly sterilized by boiling or a cereal preparation shall be used. The principal cereal preparations employed for the purpose are barley water, rice water, and oatmeal water. On the one side have been those who say that, as woman's milk does not contain starch, and as the function of converting starch is in process of development during the first ten or twelve months of life and should therefore not be taxed, starch should not form any part of the infant's food in the early months of life.

On the other side the claim is made that starch in small quantity, acting mechanically or otherwise prevents the coagulation of milk into hard and firm curds, facilitates the digestion and the utilization of the proteids of milk. The argument for the use of decoctions of the cereals may be presented in the following quotations from eminent authorities.

Dr. Abram Jacobi, of New York, has for more than forty years continuously advocated the use of decoctions of the cereals for the dilution of milk for bottle-fed babies. His report to the children's section of the International Medical Congress held in 1900, contained these words:*

"Starch shares some of the properties of all carbohydrates. As early as 1881, Voit proved their equivalence with milk-sugar and grape-sugar in regard to their effect on the decomposition of albuminoids. During feeding with carbohydrates the con-

† The cut does not show the full number of bottles nor the rack holding the bottles.

* *Pediatrics*, X., 245. 1900.

sumption of albuminoids is diminished and becomes in part unnecessary. Increase of muscle goes, to a certain extent, hand in hand with the *diminution* in the food of albumin and with the *increase* of carbohydrates. That agrees perfectly with the experience. Gregor had lately when he found that his infants when nourished on milk containing sufficient quantities of starch were more active and less rhachitical than the average, and with Kassowitz's experience, according to which 50 per cent. of his rhachitic infants were indeed breastfed, not to speak of my own observations now extending over much more than forty years and made on tens of thousands of infants in whom *not exactly large* amounts of starch but cereals containing a *small percentage* of starch, were proven to add to health and strength in preference to anything else when combined with milk, and with sugar and salts in the average cases, and in cases of incipient rhachitis with animal food.

"It is understood, and Biedert and Escherich emphasized the fact that milk-sugar cannot be tolerated in sufficient quantities to have all the effect claimed for carbohydrates. Nor is dextrinized flour (malt), even in Arthur Keller's opinion, the best, or only carbohydrate to be employed. Though using it in preference, he admits that safety lies mainly in the admixture of wheat-flour to his malt-soup, the latter when not so mixed giving rise to diarrhea. He states distinctly that the beneficent effect in doubtful cases must be due to the starch of the wheat, inasmuch as all the other constituents of the wheat are contained in the malt also. Thus, he too attributes the principal effect to the starch.

This leads us to the consideration of starch from another point of view. Not only does it save feeding with albumin, the excess of which leads so easily to intestinal putrefaction, not only is it (together with other carbohydrates) the principal source of muscular force in general and of the heart in particular, mainly in acute diseases (and probably better than alcohol), but it acts as a direct intestinal antiseptic. I need not prove that, as it is a generally accepted fact.

"Heubner was converted to believe in the good there is in flour-feeding by the observation that infants sick with gastrointestinal disorders bear and require flour, and that nurslings before the fourth month of life dextrinize and absorb it. He

prefers simple flours, mainly oats and rice, to any compound. To him and to Carstens a good deal of change in the public medical opinion in regard to the estimation in which flours are held is due.

"At present it begins to be considered fair to accept that milk becomes more digestible by the addition of flour decoctions, and that starch is not only changed in the upper but also in the lower intestine, even of moribund infants, an occurrence which need not even depend on the presence of microbes.

"I suggest that whatever is possible in the sick and in the moribund, is not difficult in the well.

"Is starch digested by the very young?

"Schiffer proved the transformation of starch into sugar within from five to ten minutes in the mouths of babies, of whom one was two hours, one sixteen days, and one two months old. Zweifel demonstrated the diastatic effect of the parotid of an infant of seven days within four minutes; even in the case of one that died on the eighteenth day of its life of gastro-enteritis, there was some little diastatic action in the parotid infusion. Korowin in his last paper on the subject, says, verbally: "There is a distinct diastatic influence of the oral secretion from the first minute. It increases with every month. Infusions of the parotid prepared at different periods after death will transform starch. Infusions of the pancreas of infants that died in the first three weeks had no diastatic action; it begins with the fourth week but remains feeble to the end of the first year.'"

Editorially one of our medical journals* says:

"An important although hitherto unsuspected action of carbohydrates when added to cow's milk is that they decrease nitrogenous elimination. When maltose was added to the cow's milk of a baby's dietary, Keller found that the elimination of nitrogen was reduced to less than one-half what it was before. The striking difference between mother's milk and cow's milk as far as regards infant nutrition seems to be that while most of the nitrogenous material absorbed by the breastfed infant is retained—a percentage of retention as high as 80 per cent. has been noted—the bottlefed infant on a diet of cow's milk alone retains very little of nitrogenous substances absorbed—in one case only a trifle more than 5 per cent. of the amount supplied.

* Medical News. LXXVII., 384. 1900.

This rule applying to the retention of important albuminous material holds also for children who are not well. In them the nitrogenous waste when on an exclusive cow's milk diet is prone to be excessive, sometimes reaching 99 per cent. of the amount ingested. The addition of a carbohydrate to the food at once reduces this waste and leads to the retention of albumins in the system."

Dr. H. D. Chapin† tells us that he has tried all kinds of infant feeding with that hardest class of cases, bottle-fed babies in hospital and dispensary practice. By adding gruels to the milk, the best results are obtained with these babies. The theory is that the cereal will help attenuate the curd of cow's milk and aid in the nourishment of the baby; in practice, the infant is not so apt to vomit thick curds, and the tendency to a stationary or losing weight is often lessened.

Dr. Rotch, of Harvard University, has been one of the most strenuous objectors to the addition of cereal decoctions to milk mixtures for infants, not believing that starch thus used exerted a favorable action in breaking up the curd, but at a meeting of the Maine Academy of Medicine and Science last winter he frankly admitted that recent experiments had proved that a certain small amount of a cereal added to the modified milk does exert this power.*

The experiments to which he refers were undertaken, at his suggestion, by Dr. F. W. White in the laboratory of the Massachusetts General Hospital. They consisted of experiments in test tubes and experiments on animals. The results led him to the following conclusions:

1. Dilution of milk with cereal decoctions of proper strength renders the casein curd much more fine, soft, and digestible than simple dilution with water. There is no difference in the action of various cereals, such as barley, oats, rice, or wheat.

2. The above property is due mainly, if not wholly, to the starch in solution. The most desirable amount of starch in the milk mixture for practical use is approximately $\frac{3}{4}$ of 1 per cent.†

Chapin,‡ and this is also true of others, believes that the best general diluent for cow's milk is a cereal gruel in which the

† *Medical Record*. LVI., 182. 1899.

* *Jr. of Medicine and Science*, VIII., 37. 1902.

† Reprint from *The Jr. of the Boston Society of Med. Sciences*. V., 125. 1900.

‡ *Theory and Practice of Infant Feeding*. 1902.

starch has been dextrinized or rendered soluble by the action of diastase. Dr. White, however, found that diastase, by converting the starch to dextrine and maltose, promptly lessens and removes the action of cereal waters upon casein. Its addition is, therefore, not a practicable measure when action upon the curd is desired.

The evidence now seems to be conclusive that an attenuated cereal water made from barley, wheat, rice, or oats—from the last when constipation exists and from one of the other grains at other times—is the best diluent for cow's milk. While good results follow the use of very dilute gruels made from the cereals, only pernicious results may be expected when uninstructed persons administer thick or pasty amylaceous mixtures to infants in their early months. Two tablespoonfuls of a cereal flour—barley, wheat, or other—mixed thoroughly with enough cold water to form a thin paste, should then have added to it enough boiling water to make one quart. It should then be boiled fifteen minutes at least.

Percentage Feeding.—The crudest form of modifying milk for infant feeding was to dilute it with water and then sweeten it: but the dilution of the milk for the purpose of diminishing the casein and rendering the curds which result from its coagulation less troublesome reduced the fat far below the quantity which is required for the normal development of the child. The effort of Dr. Meigs and others to prepare milk mixtures whose composition should approximate as closely as possible that of mother's milk was a distinct advance, but these methods of feeding were not flexible enough. While scoring a considerable degree of success they did not provide accurately enough for the wants of infancy from the earliest days to the period of weaning nor for the special needs of a larger class of difficult cases due to prematurity, acute or chronic digestive disturbances, and other abnormal conditions. Digestive and nutritional disorders, so far as the food is a factor, may be due to an excess or a deficiency in any one of the three food principles, fat, proteid, or sugar. The adaption of the quantity of each of these to the needs of the individual child was not possible until the present method of percentage feeding was devised. Percentage feeding is therefore a method by means of which we are enabled to measure out the various food constituents with a degree of accuracy and to know their percentage strength. The prime requisite now in

infant feeding by any methods which are not obsolete is to accustom one's self to thinking in percentages and to arranging milk mixtures upon a percentage basis.

Home Modification.—Of the many methods which have been suggested for calculating the percentages of fat, sugar, and proteids, some presuppose a knowledge of the higher mathematics, others, though not assuming this, require too complicated a calculation for every physician to carry out, while other methods, which in the minds of their authors are simple, have nevertheless not been explained with sufficient clearness to enable all persons, even some with more than the average of mathematical ability, to figure out a mixture upon a percentage basis. Perhaps the following method for doing this may be open to some similar faults, but it is hoped that it may be understood without troublesome study, and that in its use the calculations may be made with little loss of time.

The percentages of fat and of proteids in the upper portions of bottled milk after the cream has been rising for certain lengths of time have been determined analytically by various persons and tables have been presented showing the results of such analyses. The following table is given by Dr. F. M. Crandall,* of New York, and is based upon milk containing 4 per cent. each of fat and proteid, bottled at the dairy in quart bottles (32 ounces), and cooled and kept cool four hours.

TABLE NO. 2.

7 ounces top milk contain 16% fat, 4% proteids.†						
8	"	"	"	"	14	" 4 "
9	"	"	"	"	12	" 4 "
11	"	"	"	"	10	" 4 "
15	"	"	"	"	8	" 4 "
20	"	"	"	"	6	" 4 "

A great variety of percentages may be made up from these top milks, sufficing for all of the ordinary requirements of infant feeding. To secure a prompt and complete rising of the cream the milk must be bottled soon after it is drawn and must be promptly cooled.

Bearing in mind the composition of ordinarily good milk from the common breeds of cows—4.00 fat, 4.50 sugar, 4.00 proteids—,

* *Medical News*. LXXVIII., 725, 1901.

† In the home modification of milk the mother or nurse should be made to understand that the whole seven ounces must be dipped off from the top of the can though only an ounce or two may be needed for the proposed mixture.

and assuming, as we may, that, so far as practical results are concerned and to facilitate calculations, all top milks may be considered to have the same percentage of proteid (the same as that of milk); and remembering also that dilution leaves the ratio between fat and proteid unchanged, we may formulate this *general rule* for arranging milk mixtures on a percentage basis.

Quantity of Top Milk.—To get the requisite quantity of top milk in a given mixture divide its total number of ounces by the figure which represents the number of dilutions (the number of times the proteid of whole milk exceeds that of the desired mixture).

Example. We want 32 ounces of milk mixture, 3% fat, and 1% proteid. As the proteid is one-fourth of that of the top milk (or whole milk) we shall need one-fourth of 32, or 8 ounces as the quantity of top milk to be used.

Percentage of Top Milk.—Then the top milk from which the dilution is to be made must have a percentage of fat as much larger than that of its proteid as the percentage of fat in the mixture required exceeds the percentage of its proteid. Thus when the percentage of the fat in the mixture to be prepared is

4 times the proteid use	16%	top milk.
3½ “ “	14%	“
3 “ “	12%	“
2½ “ “	10%	“
2 “ “	8%	“
1½ “ “	6%	“

Example.—A 32-ounce mixture of 3% fat, and 1% proteid is wanted. As the fat is three times the proteid, the percentage of fat in the top milk to be used must be three times its (4%) proteid. A 12% top milk is therefore wanted (9 ounces from the top of the can). Or by rule of three: 1 proteid : 3 fat :: 4 proteid : 12 fat.

The percentage of sugar in these dilutions of milk may be considered the same as that of the proteids. If the mixture is one-fourth milk, there remains 1% of sugar in it; if one-half, it contains 2% of sugar. Practically it would do to add 5% (one-twentieth) of sugar to all mixtures containing less than 2 per cent. of proteid, thus giving a total of from 6 to 7 per cent.

When lime water is added 5% (one-twentieth of the mixture) is the usual quantity.

Example.—A 30-ounce mixture is required with the following composition:

Fat,	2.40%
Sugar,	6.00
Proteid,	0.80
Lime Water,	5.00

We may make our calculations as follows:

Quantity of top milk.—As 0.80 is one-fifth of 4.00 (the proteid of whole milk), one-fifth of the mixture, or 6 ounces of top milk is required.

Percentage of top milk.—As the fat in the mixture is 3 times the proteid, the fat of the top milk must be three times the (4) percentage of its proteid, or 12%.*

Limewater.—Five per cent., or one-twentieth of 30 ounces, is 1.5 ounce.

Sugar.—The top milk will carry to the mixture about 0.80 per cent. of sugar. We must therefore add 5.2 per cent. 30 ounces $\times .052 = 1.5$ (1.56) ounce.

Water or other Diluent.—As the sugar should be dissolved in a part of the water the total quantity of water should be 22.5 ounces. The several quantities required are therefore:

12% Top milk,	6 ounces.
Limewater	1.5 “
Diluent,	22.5 “
Milk Sugar,	1.5 “

For those who may prefer to do so the rule-of-three may be used in calculating the quantity of top milk and its percentage of fat. Thus, for 16 ounces of 1.50 fat, and 0.50 proteids:

Quantity, 4.00: 0.50:: 16 ozs.: 2 ozs.

Percentage, 0.50: 1.50:: 4%: 12%.

or for 24 ounces of 2.50 fat and 0.80 proteids:

Quantity, 4.00: 0.80:: 24 ozs.: 4 4-5 ozs.

Percentage, 0.80: 2.50:: 4%: 12½%.

The following table† may serve as a general guide to the modification of milk for an average healthy infant. It shows the manner in which the changes required by the age and development of the child are made.

* It should hardly be necessary to remind that to obtain a 12% top milk, the whole 9 ounces must be removed from the top of the jar, although we are to use only 6 ounces of it.

† From Holt, Diseases of Infancy and Childhood, Second Edition. 1902.

TABLE NO. 3.

AGE.	PERCENTAGES OF			Ounces for one feeding.	No. of feedings in 24 hours.	Interval by day.
	Fat.	Sugar.	Proteids.			
1. Premature infants.....	1.00	4.00	0.25	1 — 1 ¹ / ₂	12—18	1—1 ¹ / ₂ hours.
2. First to fourth day	1.00	5.00	0.30	1 — 1 ¹ / ₂	6—10	2—4 hours.
3. Fifth to seventh day	1.50	5.00	0.50	1 — 2	10	2 hours.
4. Second week	2.00	6.00	0.60	2 — 2 ¹ / ₂	10	2 hours.
5. Third week	2.50	6.00	0.80	2 — 3 ¹ / ₂	10	2 hours.
6. Fourth to eighth week...	3.00	6.00	1.00	2 ¹ / ₂ — 4	9	2 hours.
7. Third month	3.00	6.00	1.25	3 — 5	8	2 ¹ / ₂ hours.
8. Fourth month	3.50	7.00	1.50	3 ¹ / ₂ — 5 ¹ / ₂	7	3 hours.
9. Fifth month	3.50	7.00	1.75	4 — 6	7	3 hours.
10. Sixth to tenth month.....	4.00	7.00	2.00	5 — 8	6	3 hours.
11. Eleventh month	4.00	5.00	2.50	6 — 9	5	4 hours.
12. Twelfth month.....	4.00	5.00	3.00	7 — 9	5	4 hours.
13. Thirteenth month	4.00	4.50	3.50	7 — 10	5	4 hours.

The percentages shown in this table are rather lower than those which were recommended until quite recently, and lower than those given in the works on pediatrics published only a few years ago. The general tendency now among the leading pediatricists is to begin with low percentages and gradually work up to the point of tolerance of the individual child, but in doing so it would be a great mistake to follow too implicitly this or any other schedule for infant feeding. These percentages are those which are adapted to the average healthy infant at the stated ages, but it often happens that infants at corresponding ages require higher percentages, or, on account of unusually feeble digestive powers, they must, temporarily, be put back upon lower percentages than are here indicated. Schedules of percentages may indicate what a child probably should have, but his digestive capacity must be the supreme law for that particular child. Starting with low percentages the first consideration should be to accustom the infant's digestive organs to the digestion of casein of cow's milk, and then, while gradually increasing the percentages, keep the strength of the milk mixture below that which would be productive of digestive disturbances. A serious and very frequent error is beginning with too high percentages and thereby inducing digestive difficulties from which it often takes weeks or months for the child to recover his normal digestive capacity.

Applying the rule given on pages 206 and 207 for the purpose of arranging food mixtures having the percentages indicated in table No. 3, we have the following formulæ, disregarding minor fractions which occur in the calculations of some of them.

No. 1. *For premature infants.*

10 ounces,	1.00 fat,	4.00 sugar,	0.25 proteids.
	16% Top milk,		$\frac{5}{8}$ ounce.
	Water, or other diluent,		$9\frac{3}{8}$ ounces.
	Milk sugar,		$\frac{1}{3}$ ounce.

No. 2. *First to fourth day.*

12 ounces,	1.00 fat,	5.00 sugar,	0.30 proteids.
	12% Top milk,		.9 ounce.
	Water or other diluent,		11.1 ounces.
	Milk sugar,		$\frac{3}{4}$ ounce.

Accurately the percentage of the top milk required is 18 $\frac{1}{2}$. To get this slightly higher percentage, a little smaller quantity of top milk, or about 8 ounces, instead of 9 may be removed.

No. 3. *Fifth to seventh day.*

16 ounces,	1.50 fat,	5.00 sugar,	0.50 proteids.
	12% Top milk,		2 ounces.
	Water or other diluent,		14 ounces.
	Milk sugar,		$\frac{3}{4}$ ounce.

When limewater is to be added its calculated quantity should of course be deducted from the quantity of other diluent to be added.

No. 4. *Second week.*

20 ounces,	2.00 fat,	6.00 sugar,	0.60 proteids.
	12% Top milk,		3 ounces.
	Water or other diluent,		17 ounces.
	Sugar,	(1.08 oz.)	1 ounce.

Here again the actual percentage of the top milk wanted is 18 $\frac{1}{2}$, requiring the upper 8 ounces to be removed from the top of the quart bottle of milk.

No. 5. *Third week.*

24 ounces,	2.50 fat,	6.00 sugar,	0.80 proteids.
	12% Top milk,		5 ounces.
	Water or other diluent,		19 ounces.
	Sugar,		$1\frac{1}{4}$ ounce.

Precision would require the use of 4 $\frac{1}{2}$ ounces of 12.5% top milk.

No. 6. *Fourth to eighth week.*

28 ounces,	3.00 fat,	6.00 sugar,	1.00 proteids.
	12% Top milk,		7 ounces.
	Water or other diluent,		21 ounces.
	Sugar,		1.4 ounce.

No. 7. *Third month.*

30 ounces,	3.00 fat,	6.00 sugar,	1.25 proteids.
	10% Top milk,		9 ounces.
	Water or other diluent,		21 ounces
	Sugar,		1.4 ounce.

Accurately, $\frac{21}{10}$ ounces of $\frac{11}{10}$ % top milk is required.

No. 8. *Fourth month.*

32 ounces,	3.50 fat,	7.00 sugar,	1.50 proteids.
	10% Top milk,		12 ounces.
	Water or other diluent,		20 ounces.
	Sugar,		1 $\frac{3}{4}$ ounce.

In making up this mixture it will be necessary to remove the top milk from two bottles of milk. The whole 11 ounces from both bottles must be removed and mixed before any is taken for the mixture. If a slight deviation from the percentages here given were made, only one bottle of milk would be needed.

No. 9. *Fifth month.*

34 ounces,	3.50 fat,	7.00 sugar,	1.75 proteids.
	8% Top milk,		15 ounces.
	Water or other diluent,		19 ounces.
	Sugar,		1 $\frac{3}{4}$ ounce

No. 10. *Sixth to tenth month.*

36 ounces,	4.00 fat,	7.00 sugar,	2.00 proteids.
	8% Top milk,		18 ounces.
	Water or other diluent,		18 ounces.
	Sugar,		1.8 ounce.

Here again, as in Nos. 8, 11, and 12 more than one quart of milk must be used to obtain the requisite quantity of top milk. See note under No. 8.

No. 11. *Eleventh month.*

38 ounces,	4.00 fat,	5.00 sugar,	2.50 proteids.
	6% Top milk,		24 ounces.
	Water or other diluent,		14 ounces.
	Sugar,		1 ounce.

For this mixture 64% top milk is required, obtainable by removing about 18 ounces from the top of the bottle of milk.

No. 12. *Twelfth month.*

40 ounces,	4.00 fat,	5.00 sugar,	3.00 proteids.
	5% Top milk,		30 ounces.
	Water or other diluent,		10 ounces.
	Sugar,		.8 ounce.

The 54 per cent. top milk required may be obtained by removing about 22 ounces from each of two bottles of milk.

No. 13. *Thirteenth month.*

44 ounces,	4.00 fat,	4.50 sugar,	3.50 proteids.
	4.5% Top milk,		38½ ounces.
	Diluent,		5½ ounces.
	Sugar,		½ ounce.

It is not claimed that any system of home modification of milk can give precisely accurate results, but the differences between the actual percentages present in intelligently home made mixtures and the percentages which the physician believes he has, are probably not greater than the variation from any standard mean which we may decide on for mother's milk. Human milk varies considerably in its composition with different mothers, and with the same woman it varies from day to day, at different milkings on the same day, and at different stages during the same milking. In fourteen specimens of human milk the composition of which was determined by Dr. Harrington* the total solids varied from 10.33 to 15.30, the fat from 2.02 to 5.16, the sugar from 5.68 to 7.30, and the proteids from 1.08 to 4.17. These samples were from healthy women whose babies were doing well. In artificial feeding slight variations from day to day in the composition of the modified milk mixtures are usually of no account, and wide variations from the desired percentages may be avoided

* Rotch. *Pediatrics*. Philadelphia. 1896.

by using the mixed milk from several cows of the ordinary native breeds, excluding the Jersey, Guernsey, or any other breeds which yield milk whose percentage of butter fat is above the average. A preliminary, or an occasional determination of the percentage of fat in the mixed milk of the herd which is to be the source of supply would be an advantage. A milk of unusual richness will give a top milk with a higher percentage of fat than is shown in the table on page 206, and milk with a smaller fat content than four per cent. will give a top milk with a lower percentage of fat. This is shown in the following tabulation of the results of the assays of poor, medium, and rich milk.*

	Fat—per cent.		
	3.1	4.2	4.8
Whole milk			
Top 6 ounces.....	18.4	19.0	23.0
“ 7 “	11.6	16.4	19.8
“ 8 “	10.2	14.1	17.3
“ 9 “	9.2	12.6	15.5
“ 10 “	8.4	11.4	13.9
“ 11 “	7.7	10.4	12.7
“ 12 “	7.1	9.6	11.7
“ 13 “	6.6	9.0	10.8
“ 14 “	6.2	8.3	10.0
“ 15 “	5.6	7.8	9.4
“ 16 “	5.5	7.4	9.0
Skim milk.....	.7	.6	.4

In his admirable work on the “Diseases of Infancy and Childhood” Dr. L. Emmett Holt, gives the following advice about increasing the food of the infant:

“With all infants it is best to increase the food very gradually. Abrupt increases are very likely to derange the organs of digestion. The successive formulas of the schedule indicate the steps by which the strength of the food is increased. In increasing the quantity, it is seldom wise to do more than add half an ounce to each feeding, and often a fourth of an ounce is better. The best general rule that can be given is to increase the food when the child is unsatisfied or not gaining in weight, but is digesting well. During the early weeks both the quantity and the strength of the food must be increased every few days. It may be difficult to tell which of these is best to do. I have found it well to alternate; thus when the infant demanded more food, first increasing the quantity; then, after a few days, if still unsatis-

* Chapin. *Theory and Practice of Infant Feeding*. New York. 1902.

fied, increasing the strength; the next time increasing the quantity again, etc. In this way will be avoided the error into which mothers and nurses so often fall, who adopt a single formula and keep on simply increasing the quantity indefinitely whenever the child is unsatisfied. I have repeatedly seen infants of two or three months taking as much as 7 or 8 ounces every two hours, and even then crying from hunger. After a daily total of 35 to 38 ounces is reached, as happens with most infants by the fourth month, the increase in the food should be chiefly in strength; for the same child at eight months will rarely require more than 40 to 48 ounces.

"While the child's weight is an important guide in directing the feeding, it is a mistake to be influenced by it alone during the first two or three weeks in infants artificially fed from birth. Very low percentages are necessary until the child has become somewhat accustomed to the food. While taking such low percentages no material gain in weight is to be expected. However, if there is no vomiting or colic, if the child is entirely comfortable and sleeps most of the time, and if the stools are gradually assuming a healthy colour and normal odour, conditions may be considered entirely satisfactory. The food may be steadily strengthened with the demands of the child's appetite, and soon the increase in weight will begin, and when once begun it will be continuous. But nothing is easier than to derange the organs during the first weeks by too high percentages, and such disturbances, even though they appear trivial, often continue for many weeks. The closest attention is required for the first few weeks; for if well started, subsequent progress becomes an easy matter; but if badly started, there will be trouble most of the time.

"At weaning, or with a child who has previously had no cow's milk, one must begin, even in the case of one whose digestion seems quite normal, with percentages considerably lower than the age and weight would appear to require. At three months it is better to begin with the proportions ordinarily taken by a bottle-fed infant at three weeks; or at nine months with those usually taken by one of two or three months, making the increase in strength just as rapidly as the condition of the digestive organs warrants. A stationary weight for a week or two, or even a loss of a few ounces, is of no importance, provided the change in diet can be affected without deranging digestion, for as soon as a child

becomes somewhat accustomed to cow's milk the percentages can be raised, and progress is assured."

Household Care of Milk.—For the use of infants, bottled milk should be received from some dairyman who will intelligently do his part to have it come fresh and clean. It should be put into the bottles soon after it is drawn from the cow, and should be cooled immediately, and kept cool until it is delivered. It should be shaken as little as possible in handling and in transit, so the cream, if it is rising, shall be disturbed as little as possible. When received, the milk must remain undisturbed in the bottles, and should immediately be put into the ice-box so as to be cooled down as near as is possible to 45° F. and kept thus cooled four hours. After that length of time, the cream will have risen so the top milk may be used.

How to Remove the Top Milk.—The best and most convenient method of removing the top milk is by means of a one-ounce dipper with a perpendicular handle, as was first suggested by Chapin. When a given number of ounces from the top of the bottle of milk is required to furnish a top milk of a certain percentage of fat, the number of dipperfuls corresponding to the number of ounces are dipped off. It will be necessary to remove the first dipperful with a spoon.

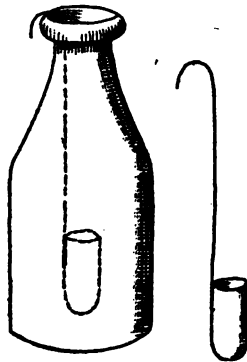


FIG. 2.

Mixing Baby's Food.—The inventory of things which we shall need is:

Bottle of milk.

Barley water, or other cereal gruel.

Boiling water.
Cream dipper.
8-ounce glass graduate.
2 Pitchers for mixing.
Milk sugar or cane sugar.
Lime water (when needed).
An agate funnel.
Feeding bottles.
Clean non-absorbent cotton.
Pasteurizer.
Ice-box, preferably wood.
Baby food warmer.
Alcohol lamp.
Rubber nipples.
Bottle brushes.
Borax, or boric acid.
Bicarbonate of soda.

These things should be used for no other than their legitimate purpose, and should be kept always cleansed and ready for use again in a place all their own. They should never be exposed to dust.

The whole quantity of food which will be required in twenty-four hours should be mixed at once, thereby saving considerable time and trouble each day. Suppose we want 9 feedings of 4 ounces each containing 3% fat, 6% sugar, and 1% proteids, a total quantity of 36 ounces for the twenty-four hours. As this requires a 12% top milk we dip off 9 ounces* from the top of the can of milk, and this whole quantity must in all cases be dipped off and put into the mixing pitcher before any is taken for making up our food mixture. As the 1% of the proteids is one-fourth of the percentage of the milk, or top milk, one-fourth of the 36 ounces to be made up, or 9 ounces, the whole quantity dipped off, will be needed. If barley water is to be used we pour in 18 ounces, half of the total bulk of the mixture. There remain 9 ounces to be made up of water in which the sugar has been dissolved. Five per cent. of sugar is 1.8 ounces, nearly six even tablespoonfuls.†

The mixture thus made is, with the help of the funnel, filled into 9 bottles, 4 ounces in each, care being taken not to soil the mouth or neck of the bottle with the milk. These bottles are

* See Table No. 2, page 206.

† Three tablespoonfuls of milk sugar, or two of granulated cane sugar make an ounce.

then stoppered with cotton, pasteurized, and then put back into the ice-box or elsewhere where their temperature may be kept at 45° or 50° F.

Feeding.—When the time for feeding comes one of the bottles, with the cotton plug in its mouth undisturbed since the pasteurization, is taken from the ice-box and placed in warm water for warming. The heat of the water is gradually increased until the milk reaches the temperature of about 100 F. Before feeding, the temperature of the food should be tested by dropping a few drops upon the wrist, never by putting the bottle to the lips or tongue. On the wrist it should feel warm but not hot. A rubber nipple is then to be slipped over the mouth of the bottle, and before feeding, the bottle should be inverted to see that the milk drops slowly but does not flow in a stream.

The best thing for warming the milk is a baby food warmer consisting of a cylindrical cup of not much greater diameter than the bottle and nearly as tall. It should have a short handle, and should contain a circular piece of perforated tin with tabs or clips bent downward to support it and the bottle a little above the bottom of the warmer. Holding but little water the bottle and its contents may be quickly warmed over the kitchen range in the daytime, or over a spirit lamp at night or while travelling.

Care of Utensils.—All things used in mixing the food—glass graduate, mixing pitchers, agate ware funnel—should be well cleansed with cold water before the milk dries upon them and then should be thoroughly scalded and reversed to drain and dry and left in that position until they are used again. They should never be dried with the wiping cloth.

Bottles.—The bottles employed for feeding should be smooth inside and should have no angles which render cleansing difficult. One of the best forms is that of the long cylindrical bottle, or so-called feeding tube shown in Fig. 3.



FIG. 3.

At the close of the meal rinse the bottle by half filling it several times with cold water and shaking thoroughly. Let it remain filled with clean water until the time arrives for scalding it before it is again filled with milk.

Nipples.—The whole apparatus for feeding babies should be as simple as possible so that it may not harbor dirt and bacteria, and may easily be sterilized. This requirement absolutely excludes the use of the nipple with the long rubber tube which cannot be cleansed properly and which has been the cause of the death of thousands of children. Recognizing its dangerous influence the French law and the ordinances of some American cities prohibit its use. The best kind is a black rubber nipple of conical shape which can be turned wrong side out for cleansing and which slips over the mouth of the bottle. The opening in the extremity should not be so large as to necessitate no suction, and it should take the baby not less than ten or fifteen minutes to get his meal, a brief rest being given now and then. Two at least of these rubber tips should be kept on hand.

The use of this form of nipple necessitates the holding of the bottle for the young infant—at least this should always be done, and done in such a manner that the neck of the bottle may always be kept full thus preventing drawing in and swallowing air. Suction should not continue a moment after the bottle is emptied.

At the end of each feeding the rubber nipple should be rinsed in cold water and washed inside and out, it being everted to facilitate its cleansing. It should then be immersed in a solution of borax, and remain in it until it is taken out to be scalded just before another feeding.

Quantity of Food.—One important thing which should be impressed upon those who care for bottle-fed babies is that the normal capacity of the infant stomach is much less than is generally assumed, and that its dilatation with excessive quantities of food should not be considered an indifferent matter. It is a very frequent and a serious error to feed too much. In the early days of life particularly it is safer to feed too little rather than incur the danger of over distending and of deranging the stomach by feeding too much. At birth the stomach holds without distension only about one fluid ounce, and at one month, two ounces. The reader is referred to the table on page 209 as an indication of the quantity of food at a meal required by the average baby.

Weighing the Baby.—"The value of the systematic recording of an infant's weight scarcely needs to be emphasized," says Dr. Griffith.* "Every physician especially interested in diseases of children fully recognizes it, for he knows that often a failure to gain, even before the child shows to the eye any ailment whatever, may be the sign that some form of illness is present or that the child is underfed. The weight-chart is even more valuable than the temperature-chart in the case of infants. The weighing, too, is such a simple matter that there is no excuse for a failure to have it carried out by the mother at least once a week, and where a change in the method of feeding is being made, twice a week. Good spring scales showing ounces are not expensive, or a steelyard or ordinary kitchen scales with weights will answer; but best are some of the standing spring scales fitted with an oblong basket or a scoop, and which are to be devoted solely to the weighing of the baby.

"It is of course understood that the weight recorded is that of the child undressed. If undressing at every weighing is inconvenient, the child may be weighed when dressed and then when undressed, and the weight of the clothes deducted. At subsequent weighings, then, it is only necessary to see that the clothing is exactly similar, and undressing will not be required."

The same trustworthy authority further says:† "The truth of the matter is that the variation is too considerable to allow of any ironbound statements regarding it. The table here given is an approximation of the length and weight which children should exhibit from birth up to sixteen years of age."

* New York Medical Journal.

† The care of the Baby, Second Ed. 1898. p. 51.

TABLE NO. 4 SHOWING GROWTH IN HEIGHT AND WEIGHT.

Age.	Height.	Weight.	
Birth.	19 inches,	7 pounds, 9 ounces.	
1 week.....	7	" 7½	"
2 weeks.....	7	" 10½	"
3 weeks.....	8	" 2	"
1 month, 20½ inches, 8½	"	"	} .. { Gained 1 ounce a day; 7 ounces a week.
2 months, 21 " 10½	"	"	
3 months, 22 " 12½	"	"	} Gained ½ ounce a day; 5½ ounces a week.
4 months, 23 " 13½	"	"	
5 months, 23½ " 15	"	"	} Double original weight. ..Gained ½ ounce a day; 4½ ounces a week.
6 months, 24 " 16½	"	"	
7 months, 24½ " 17½	"	"	} ..Gained ¼ inch a month.
8 months, 25 " 18½	"	"	
9 months, 25½ " 19½	"	"	} ..Gained about 1 pound a month.
10 months, 26 " 20½	"	"	
11 months, 26½ " 21½	"	"	} Treble original weight.
1 year, 27 " 21½	"	"	
2 years, 31 " 27	"	"	} ..Gained 4 inches a year.
3 years, 35 " 32	"	"	
4 years, 38 " 36	"	"	....Double original length.

Special Mixtures.—To meet certain indications in infant feeding a variety of special preparations are used, some of which are the following:

Cereal Gruels.—When required as a diluent of modified milk mixtures, one of the following four kinds of cereal gruel or cereal water is most frequently prescribed. When the purpose in view is merely the mechanical action of the starch gruels in rendering the curd more flocculent one-half of the bulk of the milk mixture should consist of a cereal gruel made with two tablespoonfuls of barley, wheat, rice, or oats, preferably in the form of flour or meal, to one quart of water. Mixed half and half with milk, the food mixture contains about three-fourths of one per cent. of starch, the proportion which Dr. White found to be the most desirable.*

Barley Water.—To two tablespoonfuls of barley flour add enough of a quart of cold water to make a thin paste, then add the remainder of the quart of water; stir, and boil fifteen or twenty minutes. Barley flour is more convenient to use than pearl barley. When the latter is used, the same proportions of cereal and water may be taken, but the boiling must be continued two or three hours, enough water being added meanwhile to keep the quantity up to one quart when the preparation is done. Strain.

This is often employed to prevent the formation of large, compact curds in milk, or as a temporary substitute for milk in cases

* See page 204.

of acute indigestion in infants. Barley water and other similar diluents should be freshly prepared every day. They should not be used after there is a possibility that souring has begun.

Wheat Gruel.—Prepare the same as barley water using, instead of barley flour, two tablespoonfuls of wheat flour to the quart of water.

Rice Water.—Use two tablespoonfuls of rice flour to the quart of water and prepare it as is directed for barley water; or put two tablespoonfuls of rice, thoroughly washed, into a quart of water and place near the fire where it may soak and be kept warm for two hours; then boil slowly for two hours longer, add more water as evaporation occurs so that the final mixture will be one quart. Strain. This is considered a useful diluent for milk particularly in cases of diarrhea.

Oatmeal Water.—Stir two tablespoonfuls of oatmeal into one quart of boiling water; cover and let it simmer for two hours. Replace the water as it evaporates. Strain. This is often prescribed in place of plain water or instead of barley water or other cereals for diluting milk when constipation exists.

Whey and Whey Mixtures.—As was stated in enumerating the differential qualities of breast milk and cow's milk there is a marked difference in the character of the proteids in the two milks, in that the relative proportion of the albumin to casein is very unlike. The results obtained by different analysts vary somewhat, but it may be stated that in human milk the percentage of albumin is about twice that of the casein, while in cow's milk the albumin is only about one-fourth that of the casein. Furthermore, this large percentage of casein in cow's milk and its greater degree of indigestibility when compared with human milk make it necessary to dilute very largely cow's milk when used for infant feeding. But when this is done the percentage of the easily assimilable part of the proteids, albumin, comparatively low in whole milk, is reduced to a small figure.*

In infant feeding a contingency thus often presents itself due on the one hand to the indispensable need of a due proportion of proteids in the food of the infant, and on the other hand to the digestive inability of the infant to utilize this due percentage of protein when presented to it almost wholly in the form of cow's

* In cow's milk (whole milk) the percentage of albumin is only 0.66 and of casein about 2.48 (Van Slyke). In human milk the albumin is 0.59 and the casein 1.23 (Koenig.)

milk casein. To overcome this difficulty we sometimes resort to the expedient of increasing the percentage of the soluble proteids by the use of whey as a part of the diluent of the milk mixture. The whey which results from the removal from milk of its fat and casein consists essentially of a solution of milk albumin and of milk sugar in water.

The use of whey is no new thing in infant feeding, but several specialists, European and American, have made a practical application of the idea and have emphasized the value of whey as a part of the diluent, when it is desirable to increase the easily assimilable proteids and, at the same time, to keep the percentage of casein down to a very low figure. Given alone or mixed with cream or top milk in various proportions, it is valuable for the newly born infant, for older infants whose capacity for digesting casein is limited, or for tiding them over attacks of indigestion.

"Whey, with or without an addition of two or three drams of milk-sugar to the pint," says Ashby,* "makes a useful food for newly born infants who have to be artificially fed, or for infants who suffer from chronic vomiting or have liquid, green, and curdy stools. They gain weight and are more comfortable than when taking diluted milk.

"It is often convenient to give dyspeptic infants whey at first, or even dilute the whey with a solution of maltose or barley-water, as such infants cannot always digest as much as 2 per cent. of fat in their food. As they improve, add milk to the whey, or 'top-milk,' as their digestive powers gain strength."

The composition of whey according to König is, fat, 0.32; proteids, 0.86; sugar, 4.79; salts, .65; water, 93.38. The proteids of whey as found by White and Ladd and as given by the U. S. Department of Agriculture is practically 1.00%. From his study of the results obtained by Van Slyke and others, the ratio of casein to albumin in cow's milk, as deduced by Wescott† is 4 to 1. We may therefore in mixtures consisting of top milk, and whey as a diluent count on about 1.00% of proteids in the whey and milk albumin. Wescott has published formulæ for the calculation of the percentages of whey mixtures, and of the results of their use he says:

"In practice the use of mixtures prepared under this system of modification has yielded the most gratifying results, especially

* Edinburg Med. Jr.—Arch. of Pediatrics, XVI., 476. 1899.

† Amer. Jr. of the Med. Sciences, CXXII., 439. 1901.

with cream and whey, or milk and whey, or cream, whey, and water, or cream, milk, whey, and water combinations. In the most difficult cases, in which very low percentages of caseinogen are at first required these combinations may be used in a sort of progressive series, beginning with a cream, whey, and water, or a cream and pure whey mixture. Then by a gradual increase of the caseinogen percentage secured by adding successive small quantities of milk, while the whey or water is decreased equally so as to preserve a constant total quantity of the mixture; the combination becomes one of cream, milk, and whey, or cream, milk, whey, and water; and if the decrease is confined to the whey alone, or if at the time the milk is increased the water is also increased while the whey alone is decreased, we after a time reach a point when the quantity of whey becomes so small, say six to eight ounces, that it may be omitted altogether, its bulk being supplied by the same quantity of water. Thus the mixture becomes a simple cream, milk, and water modification, from which, by continued increase of milk, decrease of water, and, after the fat percentage reaches 4.00, by appropriate decrease of the cream, we finally reach whole milk.

"In a very few cases the addition of whey to the mixture in any proportion has seemed to produce pain and indigestion. * * * In a large number of other infants, of from four to five months or older, most of whom suffered from serious catarrhal disease, the result of previous faulty methods of feeding whey has been perfectly borne, and has yielded results which seemed impossible under other forms of feeding. In not a few of these cases whey has formed the almost exclusive means of supplying proteids in mixtures consisting of cream and all whey. In all these cases the improvement of nutrition under whey modifications has been striking and comparable only to that to be sometimes attained by resort to the breast milk of a perfectly satisfactory wet-nurse."

As to the influence of whey in rendering the casein curds more flocculent, White and Ladd found that "whey cream-mixtures yield a much finer, less bulky, and more digestible coagulum than plain, modified mixture with the same total proteids; the coagulum is equalled in fineness only by that of barley-water mixtures."

Preparation of Whey.—Wescott's directions for preparing whey are as follows:

"In preparing the whey the separated milk is warmed to a temperature of 100° F., and essence of pepsin, liquid rennet, or a

junket tablet added to it. About two teaspoonfuls of essence of pepsin to the pint are required, while liquid rennet, according to White and Ladd, is active in the proportion of one drachm to two quarts. The junket tablet is a cheap, convenient, and very efficient means of precipitating the curd, and has been generally preferred by mothers who have tried all three agents.

"The milk is kept at 100° F. until coagulation takes place, and it is then put aside in the refrigerator to favor contraction of the curd and exudation of the whey. At the end of half an hour the solid curd is to be cut into small cubes, put into a freshly-boiled cheese-cloth bag of double thickness, and allowed to drain simply by gravity, since squeezing forces some of the curd through the meshes of the bag. After the whey is thoroughly drained it should be heated to a temperature of 150° F. in order to destroy the rennin, and again cooled before being finally mixed with the other fluids. When partial predigestion of the milk and cream has been effected this heating of the whey is not necessary, unless it be desired for its pasteurizing action. Otherwise, in combination with raw milk the excess of rennin in the whey would cause precipitation of fresh curd."

Dextrinized Gruels.—Before starch can be absorbed and utilized as nutriment it must be cooked and then converted into dextrine and maltose. In the adult the saliva and the diastatic ferment of the pancreatic juice rapidly convert starch into dextrine, and maltose, forms of carbohydrates which are readily available as food, but during the period of infancy this function is only in its developmental stage and the infant in the first few months of life should be considered incapable of transforming starch into usable compounds, though very small quantities of unconverted starch, acting mechanically, serve a useful purpose in rendering the curds of cow's milk more flocculent and consequently more easily digestible. By means of the artificial dextrinization of the starch of cereals, preparations may be had which are very useful under various conditions in the artificial feeding of infants, whether as an addition to the ordinary modified milk mixture for the purpose of increasing its percentage of carbohydrates, or alone or mixed with egg albumin, or when it is necessary temporarily to withdraw all milk foods. Chapin particularly has been an earnest advocate of the use of these dextrinized gruels, of which he says, the youngest infant can

usually assimilate them, and that in fact in many cases there is no other form of nourishment so well borne. "The advantages of this form of diluent are: (1) It acts mechanically on curds; (2) it furnishes tissue-building proteid in appreciable amount; (3) it forms the best temporary substitute for milk; (4) it is always at hand when wanted; and (5) it can be easily and cheaply prepared." *

The process of making dextrinized gruels recommended by the same author is to beat up one to two heaping tablespoonfuls of barley, wheat, or rice flour with enough cold water to make a thin paste; or use two to four heaping tablespoonfuls of rolled oats. Pour on a quart of boiling water and *boil* for at least fifteen minutes, preferably in a covered double boiler as the gruel will not then burn. If the mixture is to be dextrinized after it is cooked, place the cooker in cold water, and when the gruel is cool enough to be tasted add one teaspoonful of diastase solution, or Cereo, and stir. This will thin the gruel. Strain add salt to taste, and cool.

Wheat, barley, and rice are well absorbed and should be used when the bowels move naturally. Oatmeal contains considerable coarse material that stimulates the bowels, and should be used when the bowels are constipated.

He also gives the following directions for the preparation of a home-made solution of diastase:

"A tablespoonful of malted barley grains crushed is put in a cup and enough cold water added to cover it, usually two tablespoonfuls, as the malt quickly absorbs some of the water. This is prepared in the evening and placed in the refrigerator over night. In the morning the water, looking like thin tea, is removed by a spoon or strained off, and is ready for use. About a tablespoonful of this solution can be thus secured and is very active in diastase. It is sufficient to dextrinize a pint of gruel in ten or fifteen minutes. Such a decoction must be prepared each day as it soon spoils, owing to the unstable nature of the enzyme. For this reason it may be more convenient to use some commercial preparation of diastase."

Albumin-Water.—Add the white of one egg and a pinch of salt to half a pint of cold water and stir until the mixture is com-

* Theory and Practice of Infant Feeding, New York, 1902.

plete. Sweeten if desired and strain to prevent the clogging of the rubber nipple by minute shreds. Should be warmed only moderately before it is given. It is used as a temporary nourishment when milk does not agree, and is sometimes recommended as an addition to milk mixtures when it is necessary to reduce the casein to a very low percentage.

In digestive disturbances when the fat, sugar, and albuminoids all have to be reduced to minute quantities, Townsend* finds that the nutritive value of the mixture can be greatly increased without taxing the digestion, by the addition of raw white of egg.

In summer diarrheas when it is necessary to withhold milk, Chapin† finds that egg-water is one of the most easily procurable and satisfactory substitutes. The only objection is its tastelessness and this may be overcome by the addition of a few drops of aromatic spirits of ammonia which checks stomach irritability when there is a tendency to vomit.

The white of egg mixture had been used extensively by Dr. Kerley‡ but he has discarded it because many children fail to digest it. In the discussion which followed, Dr. Koplik was surprised at the abandonment of the use of albumin water. He and Dr. Morse had both found it very useful, particularly during the first few days of life. Dr. Rotch preferred the albumin derivable from milk and stated that albumin water is usually given in too high a percentage.

Zahorsky§ has used for young infants a mixture of milk, white of egg, and sugar, so that the proportion was as follows: Casein, 0.75; ovalbumin, 0.75; fat, 2.5; sugar, .6. This has reaped no favorable results. Diarrhea developed in most cases. Vomiting ensued, and in all but one there was no gain of weight in ten days. This one infant, which had been suffering from malnutrition and was almost moribund, gained nearly a pound in a week. The conclusion is forced upon us that ovalbumin does not replace lactalbumin in young infants. It was noticeable that the curds of this mixture were smaller, similar to human milk.

Dr. White,** on the other hand, in experiments made to determine the one point of its action upon the coagulation of milk

* Boston Med. and Surg. Jr., CXL., 275. 1899.

† Medical News, LXXV., 65. 1899.

‡ Archives of Pediatrics, XVIII., 561. 1901.

§ Pediatrics, V., 537. 1898.

** Reprint from Jr. of the Boston Soc. of Med. Sc. V., 125. 1900.

casein, found that its action in this respect is much inferior to starch. "The best albumin water mixture containing 3 per cent. of white of egg yielded a curd which was much less fine than a mixture containing only a quarter as much soluble starch."

Judson and Gittings* express their judgment of this matter as follows:

"Hesse was the first to use egg albumin in his infant food. Now there are various preparations on the market which base their claims to be perfect substitutes for the maternal nourishment on the presence of a certain amount of white of egg. Apart from the question of its digestibility, there seems to be some reasonable doubt whether egg albumin is sufficiently well assimilated to aid very materially the infant's nutrition. At the same time it serves a useful purpose at certain critical periods when the administration of milk in any form is contraindicated. Egg albumin may be given either mixed with water and a little salt or added to various decoctions of starch, meat broths, etc. It is probably inferior to whey in nutritive value."

Peptonized Milk.—The giving of peptonized milk has been considered a valuable expedient in the feeding of some difficult cases, particularly in attacks of acute indigestion and in some chronic cases with feeble casein digestion, but now with our somewhat varied resources in infant feeding the need of predigested milk is less frequently felt than formerly. Peptonization may be carried out as follows:

Into a clean quart bottle empty the contents of a peptonizing tube (Fairchild Bros. & Foster's, or other), then pour in a few ounces of the water which is to be used for the dilution of the milk, and shake thoroughly. Add the milk and the remainder of the diluent and again shake. Place the bottle in water of the temperature of 115° F., or about as warm as the hand can bear comfortably and keep the contents of the bottle thus warmed for a length of time depending upon the degree of peptonization which it is desired to bring about—ten, twenty, or thirty minutes. Milk which has been peptonized for ten minutes is altered but little or not at all in taste, but that in which this process is continued for twenty minutes has acquired a slightly bitter taste due to the formation of peptones. This bitter taste increases with the duration of the process of artificial digestion. When it is

* *Infant Feeding*, p. 201. Phila., 1902.

desired to arrest the peptonization, the process may be stopped by placing the milk upon ice, or more surely by raising the temperature of the milk to the boiling point at once destroying the ferment.

The following instructions relating to the administration of peptonized milk are given by Judson and Gittings.*

"For a new-born infant the proportions of our peptonized milk mixture should be about one per cent. proteids, from two to two and a half per cent. fat, and six per cent. sugar. If this is well tolerated, the strength of the mixture may be increased to one and a half per cent. proteids, three per cent. fat, and six per cent. sugar at the end of the fifth or sixth week. If it is desirable to continue this mode of feeding during the third and fourth months, the proportions may be increased to proteids two per cent., fat three and a half per cent., and sugar seven per cent.

"It must be understood that peptonization is only a temporary expedient, and that it is inadvisable, except for difficult cases, to continue the process over a longer period than two or three months. By gradually reducing the time of peptonization, there will seldom be any difficulty in replacing this food with a milk mixture containing the same proportions.

"Milk and cream may be mixed in any desired proportion and the process of peptonization can be carried out for from ten minutes to half an hour or longer. It requires about two hours to completely peptonize milk. The use of pre-digested milk offers disadvantages in that this food does not furnish the necessary physiological stimulus to the infant's stomach, since it is offered already prepared for intestinal digestion and absorption. Where the milk is only partially peptonized, this objection has less weight. It is well to begin with half an hour's peptonization, gradually reducing the time as the infant's digestive powers regain their normal condition."

Condensed Milk.—The following quotations from the words of eminent specialists in diseases of children may be considered a fair expression of the opinion of the profession in regard to the use of condensed milk in infant feeding.

Griffith.† "I have seen so many babies starving on condensed milk that I now rarely give it. It is true that some babies grow

* *Infant Feeding*, Philadelphia. 1902.

† *The Care of the Baby*. Second Ed., 1898, p. 149.

fat and are seemingly healthy, but the health is often only apparent, and rickets is very liable to result."

Starr.* "Infants fed upon condensed milk, though fat, are pale, lethargic and flabby; although large, are far from strong; have little power to resist diseases; often cut their teeth late, and are very likely to drift into rickets. It must be remembered also that condensed milk, when long kept, or when packed in imperfect cans, not infrequently undergoes decomposition, and thus becomes utterly unfit for use.

"For a temporary change of diet, and as a substitute during travelling or under circumstances in which sound cows' milk cannot be obtained, it may be resorted to with advantage."

Crandall.† "Diluted condensed milk always produces rickets if its use is prolonged, for it is deficient in fat and proteids. A dilution of 1 in 12, the one most commonly used, contains but one-eighth the amount of fat and one-third the amount of proteid of average breast milk. Double that strength contains but one-fourth the proper amount of fat, but the sugar is so excessive as to soon upset the stomach. A food so wide of the standard is not a proper one for an infant."

Wells.‡ "Children fed on condensed milk soon become fat, and for some time the digestion really seems to be improved; this is more frequently the case if the child is changed to a diet of this substance from one of farinaceous foods. After a continued diet of condensed milk, however, a child generally becomes flabby, restless or sleepy, suffers from impaired digestion with considerable fermentation, and is apt, sooner or later, to drift into a condition of marasmus. Some of the worst cases of simple atrophy that we have seen have been infants who have been fed for a long time on this form of diet. In these children the period of dentition comes later, is irregular and prolonged, and a strong tendency to rickets or a chronic state of malnutrition is manifest. It has also been noticed that if children fed on this diet fall into a subacute diarrhea, it is almost impossible to save their lives."

Kerley.§ Of the many hundred marasmic and rachitic infants that I have had an opportunity to observe, fully ninety-

* Hygiene of the Nursery. Sixth Ed., 1898, p. 175.

† Medical News, LXXVIII., 725. 1901.

‡ Jr. of Amer. Med. Assoc., XXXI., 1016. 1898.

§ Medical News, LXX., 736. 1897.

five per cent. had been fed on the meal foods or on canned condensed milk, chiefly the latter. This ill-conditioned class of children, with their starved muscular and nervous systems and catarrhal tendencies, fall an easy prey to the infectious diseases during the entire year, to broncho-pneumonia in winter, and to the gastro-intestinal diseases in summer."

Nevertheless in his dispensary practice Dr. Kerley often uses condensed milk.

"I employ condensed milk voluntarily under one condition only. I meet with a few delicate infants, usually from two to ten weeks old, who must be bottle-fed, and for whom it is impossible to modify fresh cows' milk. These children are unable to assimilate the proteids contained in fresh cows' milk in sufficient amount to thrive; and under these circumstances I order the unsweetened or canned condensed milk, preferably the former. A dilution of one-in-twelve will oftentimes be borne without inconvenience, and the child will do well for six or eight weeks, when it will be able to digest a modified fresh cow's milk containing a low percentage of proteids."

"I employ the canned condensed milk because I am obliged to do so in the case of several hundred infants each year. I use it among the very poor, the ignorant, and the careless who bring their children to the dispensary, and for this reason: The very poor cannot afford cows' milk at six or eight cents a quart, neither can they buy refrigerators or ice to properly keep the milk. The ignorant cannot appreciate or follow out the instruction as to the dilution and care of the milk. This class also may be included under the first heading. We occasionally meet with representatives of the careless class in the better walks of life. They insist upon feeding condensed milk to their children against our wishes, their excuse being that such a plan is the easiest to follow. The wives of the American and Irish laborers comprise a goodly number of the indifferent class. The proprietary foods are happily excluded from the uses of the poor, for the reason that they are expensive."

To make up the deficiency in fats Dr. Kerley prescribes cod liver oil or, when the parents can procure it, cream, and to increase the percentage of proteids, a meat broth is added, making what must be considered a poor substitute for mixtures made with fresh milk.

Summarizing, it may be said that condensed milk, like the patent foods generally, is deficient in fat and proteids, but has an excess of carbohydrates in the form of sugar. It may be fed for short periods of time when better food is not available, but the hand-fed baby should be brought back as soon as possible to a properly modified mixture of fresh cow's milk.

Patented Infant Foods.—A large number of patented or proprietary foods for infants are upon the market. The manufacturers claim that they are "perfect substitutes for mother's milk," but for not one of them is this claim true. They are lacking in proteids in an easily available form and in fats, and have an excess of carbohydrates. A more trustworthy and a better and cheaper substitute can be prepared in any household from good, clean cow's milk and other material needed for its modification. Then a tolerably correct idea may be had of the nutritive value of what the baby is getting and whether it is adapted to its wants.

Referring to patent foods for infants Rotch* says:

"Analyses show that there is a lack of uniformity in these foods from year to year, and that original claims are apparently forgotten or allowed to give way to cheaper production. In fact, as my experience in the feeding of infants increases, and as I examine year by year the effects of the different foods on infants, I am strongly impressed with the belief that with our present physiological, chemical, and clinical knowledge all the patent foods are entirely unnecessary. The claims made for them are not supported by intelligent and unprejudiced investigation."

The opinion of Griffith† is that some of them are harmful and none of them are necessary or desirable for a child with a healthy digestion.

Cantley‡ states as an axiom that proprietary foods are unnecessary for the proper feeding of infants so long as good cow's milk, cream, and sugar are available. They should never be used before the sixth month, and then only as diluents.

Dr. Zahorsky,§ of St. Louis, tells us that "all the patent foods lack in albumen and especially in organically combined metals.

* *Pediatrics*. Philadelphia, 1896. p. 268.

† *The care of the Baby*, p. 148. 1898.

‡ *Treatise on Infant Feeding*, quoted by Judson and Gittings.

§ *Pediatrics*, V., 536. 1898.

In these is found an absence of extractives and unknown substances in milk; consequently none can be recommended and all are, in a large percentage of cases, followed by the various diseases of nutrition.

"Prof. Saunders has frequently pointed out a nutritional disorder which he calls 'salts starvation'; especially does it follow certain patent foods, the salts of which are deficient, or exist merely as bases neutralized by inorganic acids."

Dr. S. W. Abbott, Secretary of the State Board of Health of Massachusetts, referring to the various substitutes for milk in artificial feeding says:

"The readers of magazines and other periodicals are treated with pictures of children of marvellous beauty, who are said to have been reared upon the different kinds of milk substitutes. All these methods of advertising appeal to the public eye, but medical men know full well the specious character of such advertisements. If the photographs of the dead infants who crowd the graveyards could be shown, the ratio of the dead to the living among those who were fed upon milk substitutes would be found to be at least ten times as great as that of the infants who were nursed at the mother's breast."

The Significance of Some Symptoms.—"Colic may be caused by an excessive quantity of proteid in the food or by the infant not being kept warm enough, especially the bowels and extremities. The excess of proteid in the food may be reduced by increasing the dilution. *Persistent vomiting* may be caused by feeding too great a quantity at a time; from too much fat or cream in the food, or by poisonous products in the milk, the result of bacterial growth. *Abnormal stools* may contain curds of casein or fat, fermenting sugar, and mucus resulting from the indigested food irritating the intestine. Digestion is at a standstill and the infant is living partly on its own tissues, hence the malnutrition."*

"Biedert and Demme have devoted considerable attention to the subject of fat diarrhea. In some children the fæces showed 50 to 60 per cent. of fat, whereas the normal percentage in ordinary fæces varied from 13.9 per cent. (which is the normal quantity), according to Uffelmann.

"Casein is not nearly as common an ingredient of fæces as is commonly supposed, as I have previously stated. Casein lumps

* Chapin. *Theory and Practice of Infant Feeding*. New York, 1902.

can be seen in abundance in the course of a diarrhea during an exclusive diet of milk.

"The proteids of milk are so thoroughly absorbed that only small traces of them can be found in the fæces. Normal milk-fæces contain large quantities of bacteria, but chiefly two kinds, previously mentioned, viz.: *bacterium lactis ærogenes* (Escherich) and *bacterium coli commune*. Other germs, especially those of the proteolytic type (i. e., those that render gelatin fluid), are not found under normal conditions.

"If the sugar is too low, the gain in weight is apt to be slower than when furnished in proper amount.

"Symptoms indicating an excess of sugar: Colic or thin, green, very acid stools, sometimes causing irritation of the buttocks; sometimes there is regurgitation of food and eructations of gas.

"Excess of fat is indicated by the frequent regurgitation of food in small quantities, usually one or two hours after feeding. Sometimes an excess of fat causes very frequent passages very nearly normal in appearance. In some cases the stools contain small round lumps somewhat resembling casein, but really masses of fat. This has already been mentioned in speaking of the differentiation of true casein curds and small fat lumps by the solubility of the latter in alcohol or ether.

"When too little fat is given, it is indicated by hard, dry, pasty stools, and usually constipation. This can be easily remedied by the addition of cream three-fifths of which is fat. Holt speaks against increasing the fat above 4.5 per cent. in infants under six months old, and believes we should not go above 4 per cent."*

Dietetic Treatment of Sick Babies.—The following notes from American authors on the feeding of sick children indicate the methods of management which are generally approved.

We are told by Dr. T. S. Wescott,† of Philadelphia, that, "In the presence of a summer diarrhea of any and every degree of severity the first dietetic principle is absolutely to interdict the use of cow's milk. This principle is often violated, either because the baby may object for a time to taking a substitute which does not taste like his usual feeding mixture; or, without

* Fischer. *Infant Feeding in Health and Disease*. Philadelphia. 1901.

† Philadelphia Medical Journal. Vol. X., 125. 1902.

the physician's knowledge, the mother may keep on giving 'tastes' of milk to prevent the baby's being 'starved to death.'

"It is just as rational to expect to cure an attack of milk infection while milk is continued in the diet as to attempt to cure the morphine habit while morphine is given to secure sleep and quietness, or, perhaps with a closer analogy, to control glycosuria without excluding starches and sugars from the dietary. In such cases it is not the milk itself which may be harmful, but the continuance of favorable conditions for bacterial development kept up by the fresh supplies of the preferred culture medium for the bacteria already swarming in the intestinal canal. Milk starvation of the infant really means milk starvation of the bacteria, and as this culture medium is no longer supplied, the great bulk of bacteria perish for want of sustenance. Milk starvation, conjoined with intestinal antiseptics for the middle gut and enteroclysis for the large bowel, constitutes the chief therapeutic formula for the treatment of such conditions.

"The length of time during which fresh milk should be withheld from the diet will vary according to the degree of severity of the case and the promptness with which the intestinal discharges become normal in frequency. The most common mistake is to resume milk feeding too early, thereby furnishing material for re-infection within the intestinal canal, even though the milk itself may be perfectly sound.

"With babies who are in good condition at the onset of an attack of summer diarrhea, fresh milk should be entirely withheld for from five to six days to a week, and frequently even longer. Under the plan of feeding above suggested, a well-nourished, healthy baby will show little evidence of starvation even at the end of the week. By this time, however, or in some cases much earlier, the number of bowel movements will have decreased to one or two a day, and other evidences of intestinal irritation will have subsided. Even before this time the baby may show signs of hunger, and it will then become necessary to add something to the watery mixture to give it a body. It has been a fact of frequent observation in dispensary practice that babies with diarrhea who had been previously fed upon condensed milk could be put back upon this diet earlier and with greater safety than the babies fed upon fresh milk. This is doubtless to be attributed to the fact that condensed milk

ordinarily is a sterile preparation and that the percentage of fat and proteids in weak dilutions are quite low, both of which qualities are for the time of considerable practical importance.

"It has, therefore, seemed of advantage to make use of this property of condensed milk by employing it in very weak dilutions for a time in preference to an immediate return to fresh milk. A dilution of one drachm to four ounces of egg or barley water offers a satisfactory strength for most cases. In some instances even the weak mixture is not well digested and then partial peptonization may be resorted to.

"After the movements have become natural in consistency and frequency, the most satisfactory plan for returning to a fresh milk diet is to prepare and sterilize the milk mixture to which the baby has been accustomed, at first in quarter or half of the usual amount for the day, and to begin by taking out not more than half an ounce of the condensed milk mixture or of the other food that is being given, as prepared for the feeding, and replacing it by an equal quantity of the fresh milk mixture. This gradual substitution of one mixture for the other may be continued with varying rapidity, according to the strength of digestion, until half of the feeding consists of the fresh milk mixture; after this, or even before, the condensed milk may be omitted altogether and the feeding will consist of a one-in-two dilution of the original mixture, which will contain just half of the original percentages. From this point the proportion of the milk mixture may be cautiously increased according to the digestion as judged by the bowel movements, until all added diluent is omitted and the baby has returned to his usual feeding. Since, however, the intestinal mucous membrane is still very prone to irritation, the child may not be able to take the full strength of his original feeding mixture for a considerable length of time, say a month or six weeks. In many cases partial peptonization of the mixture may be very helpful; and in some instances, in the convalescence from a very severe attack of the disease, the whole plan of feeding may require change, and in these cases a differential modification of the proteids by means of whey mixtures may offer the most satisfactory solution of the dietetic problem."

In a study of 555 cases of summer diarrhea among the out-patient poor of New York, Dr. C. G. Kerley says:*

* Archives of Pediatrics, XVIII., 561. 1901.

"In our management of summer diarrhea we have one invariable rule of treatment; *regardless* of the severity or duration of the illness, *regardless* of the diet, whether breast-fed or bottle-fed, whether the stools are frequent and watery, or infrequent and foul, we stop the milk at once. This is based upon the belief that in every case of summer diarrhea, no matter how mild, we have an infected gut, or soon will have it, and we wish to make the intestinal contents as poor a culture field as possible.

"We have learned that every case of summer diarrhea must be looked upon as dangerous and treated vigorously whether the initial symptoms are mild or severe. *This we must teach.* A case of so-called dyspeptic diarrhea with milk feeding continued will soon become a virulent infection. I question if in the great majority of cases the streptococcus and colon bacillus play a very important part at the commencement of the illness. The average case is of gradual onset; we meet a few cases, however, in which the onset is sudden and severe.

"We not only advise that the milk be discontinued, we command it, and if the order is not complied with further treatment is refused. To those of intelligence, among whom the American-born mother predominates, we explain why the milk should be discontinued for a few days. Our directions are almost always followed. The very ignorant, among whom the Italians, Russians, etc., figure largely, are given medicine and told that if the medicine and milk or any food except that which we advise, are given together they may kill the baby; the mothers give the medicine and feed the child according to our oral instructions which are supplemented by printed directions. No milk is allowed until the stools approximate the normal, which may mean an abstinence from forty-eight hours to five months; this was the longest time a child was kept on a non-milk diet. In three it could not be given for several months. Fifty-seven suffered relapse upon resuming the milk diet. With very few exceptions barley was the substitute selected. Additions in the form of liquid non-milk nourishment were added to change the taste and give the child a variation in the diet. A favorite mixture with us is four or five ounces of barley water and one or two ounces of broth—beef, mutton or chicken. Two teaspoonfuls of beef juice added to the cereal water often makes a suitable change. The taste of the substitute must vary or the

child will soon tire of it. Broths must not be added in too large amount as in some a decidedly laxative effect will result. I usually order two or three substitute preparations and alternate them.

"Brandy and whiskey, so frequently added to substitutes, should not be given to a child with summer diarrhea. The dangers of stomach involvement and nephritis are great without our provoking them by the use of alcohol."

The following paragraphs are taken from a paper read before the New York Academy of Medicine by Dr. H. D. Chapen:*

"In general, a bottle-baby should have less bulk of food and a higher dilution of milk in very hot weather than it is accustomed to under more favorable conditions. If this simple precaution were taken much summer diarrhea would be avoided. The intervals between feedings may also be prolonged if the digestion shows any signs of derangement, but water is to be freely given during these intervals.

"The final effort of preventive treatment is to note the first signs of gastric or intestinal indigestion, as both may often be checked by simple dietetic or medicinal means before a marked diarrhea begins.

"In the detetic treatment of summer diarrhea, bearing in mind that a majority of the cases consist largely of milk-poisoning, all forms of milk must be temporarily withheld. Even the breast may be withdrawn in nursing babies until vomiting ceases. In the interval, water may be frequently given, but in small quantities at a time, if the stomach tends to reject it. The common mistake is in giving too much nourishment at this time, as the infant seems to be weak and in need of support. It is not the food taken but that which is assimilated that supports, hence it is folly to force milk upon a baby at a time when the digestive powers are weakened, if not entirely arrested. Many a summer diarrhea would be stopped at the very beginning if milk were entirely withheld for from twelve to forty-eight hours. When it is necessary to withhold milk for any length of time, other forms of nourishment may easily be substituted.

"One of the most easily procurable and satisfactory is egg-water. The white of an egg is thoroughly stirred in half a glass of cool water. This forms a pure and easily assimilable albumin

* *Medical News*, LXXV, 65. 1899.

water. The only objection is its tastelessness, and I have overcome this by the addition of about ten drops of aromatic spirits of ammonia.

"Among other substitutes for milk may be mentioned thin gruels made from barley or wheat flour and cold whey. When the cereals are used, the starch may be easily dextrinized by one of the preparations of diastase that are now on the market. If cow's milk is withheld for several days or longer, mutton-broth from which all the fat has been carefully skimmed, makes a good substitute. Expressed beef-juice with the fat removed and diluted with cool water makes a stimulating and nourishing drink.

"When the acute symptoms have subsided and milk is resumed, it must be tentatively begun at long intervals and with high dilution. If a prescription to be filled at a laboratory were written it might call for fat, 1 per cent.; sugar, 4 per cent.; proteids, 0.50 per cent.; or plain fresh milk may be diluted five or six times with sugar-water. By thus starting with a considerable reduction of the casein and fat, these solids may be gradually increased to a proportion that is proper for the infant's age and development. The difficulty of digesting the tough curd of cow's milk is a constant source of trouble. After trying various methods of overcoming this difficulty, a proper dilution of the milk with decoctions of the cereals as advised many years ago by Jacobi, has yielded the best results in my hands. In hot weather a gruel made of wheat or barley flour, and partially or completely dextrinized, will modify and attenuate the clots of casein in a favorable manner."

Doctors Holt, Jacobi, Koplik, and others took part in the discussion. Dr. Holt said that "twelve hours is more precious for therapeutic purposes at the beginning of the sickness than is a whole week of medication later on. The trouble is, however, that beginning diarrheas are neglected. They are attributed to teething, to a cold, to the weather, and it is thought that they will get better of themselves or with some simple household remedy, and with some slight modification of diet. In twenty-four hours, perhaps, a fatal diarrheic condition that defies all treatment is lighted up. Four or more movements a day in the child are allowed to occur for some days without seeking relief

for them. The infection gains a firm hold by irritation of the intestine, and then cannot be eradicated before it has produced serious effects.

"Stop all food at once until there is a decided improvement in the intestinal condition. The indication is to get the stomach and intestines empty as soon as possible. All food should be stopped absolutely for twelve hours or longer. Water may be given freely, and stimulants are often good. It must be remembered that even sterile milk does not stay sterile long in an infected digestive tract, and that its presence only irritates, while the milk itself forms an excellent culture medium for the growth of micro-organisms that are present."

Dr. Jacobi reminded the Academy of the fact that the presence of carbohydrates prevents putrefaction in the intestinal canal, and that consequently the use of the cereals in baby-food is at once a preventive and a curative agent in certain intestinal disorders.

Dr. Koplik said that "a slight frequency of stools, especially if they are of watery consistency and if accompanied by the slightest inclination to vomit, should be the signal to stop all feeding at once. Then the bowel should be promptly cleaned out and the stomach also if thought advisable."

The main points for the non-medical reader to note are the uniform insistence upon the stopping of all milk food temporarily at the beginning of infantile diarrheas, that the cessation of all food for a while is often necessary, and that the resumption of the use of milk must be very gradual. For some time there have been fair grounds for believing that some forms of infantile diarrhea, particularly acute gastro-enteritis and cholera infantum, are infectious, and that there is therefore urgent need of careful precautions not to let the infant's food become infected by exposure to a dusty air, or through the medium of dishes and utensils which have not undergone a careful sterilization with steam or boiling water. One other source of infection should be remembered—the hands of the nurse or mother after the removal of the diapers. They should, before further attendance upon the sick or other babies, and especially before preparing or handling food, be carefully washed and then sterilized with the hand brush and Parke, Davis & Co's. germicidal soap or otherwise. The diapers, before they are put into the wash,

should be soaked in a solution of carbolic acid, or lysol—Solution 1 or Solution 2, one-half strength. Diapers which have been wet should be washed and dried and warmed before they are again applied to the infant.

Mixed Feeding.—In the last few years Dr. Jahorsky,* of St. Louis, has given the subject of mixed feeding much thought and has employed this method of feeding in a variety of cases, both in hospital and in private practice. The subject divides itself very naturally into (a) artificial feeding as an adjuvant to nursing, and (b) human milk as an adjuvant to artificial foods.

Artificial Feeding as an Aid to Nursing.—"The indications for the use of artificial food as an auxiliary to human milk are several, depending on abnormal variations in the quantity and quality of the milk. Our text-books usually give only two—a deficiency of the quantity of milk secreted and a diminution of the solid milk constituents. But other conditions exist, and the principal ones I shall enumerate.

1. "The mother's milk is deficient in quantity.—This is exceedingly common. Three-fourths of the mothers, at least among the wealthier classes, do not have a sufficient amount of milk for their offspring. The gradual increase which should take place as the period of lactation advances, fails, and after a few weeks the mother cannot satisfy the infant. The bottle must be given in addition, at first possibly only once daily, then two or three times. But whatever means we use to supply the deficiency, the mother should continue to nurse regularly. Otherwise the milk secretion steadily diminishes. The act of nursing regularly is the most powerful galactagogue that we possess.

2. "The human milk is deficient in solid constituents.—When an infant at five or six months becomes anemic, does not gain in weight, and shows signs of rickets, the milk should be examined. Occasionally it is found that the percentage of proteids is very low, sometimes as low as .5 per cent. Thus in the case of a little colored baby five months' old, who showed evidence of severe anemia and rickets, an examination of the mother's milk revealed a proteid percentage of .7 per cent. The addition of cow's milk and meat juice to his diet soon had a gratifying effect on his nutrition.

* *Pediatrics*, XI., 208. 1901.

3. "The human milk contains proteids in excessive amounts causing colic and indigestion.—Colic, as found in the breast-fed infant, is an exceedingly common condition, and is usually very troublesome. The cause must usually be assigned to excessive proteids in the milk. These proteids, like those of the bean, very readily undergo gaseous decomposition, and the gas causes the violent peristalsis that causes the infant pain.

"I have found that some food containing dextrinized gruel, condensed milk, or some food which contains dextrin, sugar and starch, such as Nestle's food, given immediately before nursing has a happy effect. The artificial food dilutes the breast-milk and the carbohydrates inhibit the decomposition of the proteids. In all cases of severe colic this method should be tried, and it seems the most perfect prophylactic against colic that is known.

4. "The human milk causes diarrhea in the infant.—It is well known that colostrum has a laxative effect. Occasionally diarrhea supervenes soon after birth and persists for a long time. In many cases, no doubt, some gastroenteric infection has taken place, but in others the milk possesses decided laxative qualities. In either case a solution of dextrinized gruel administered before nursing will act very well.

5. "The human milk causes constipation in the infant.—This intractable condition is exceedingly common. In many cases a deficiency in fat exists, but in others the milk is perfectly normal, and we must ascribe the condition to excessive absorption of fat and to a congenital weakness of the muscular coat of the colon. Whatever the cause, in a great majority of cases additional feeding acts very happily. Usually a milk mixture containing about 4 per cent. of fat, 1 per cent. of proteids, and 7 per cent. of sugar, given two or three times a day, is all that is necessary. I have found an increase of proteids with egg albumen to be very laxative. Ordinarily egg water (the white of one egg to ten ounces of water sweetened with cane-sugar) acts as a laxative to young infants and will frequently overcome obstinate constipation. A few ounces of this water should be given two or three times daily.

"Older infants (eight to twelve months) seem to digest it perfectly, and the laxative effect is not so marked.

"Frequently oatmeal gruel, given in appropriate feedings two or three times daily, relieves constipation. Still greater merit

is possessed by the malted mixture, such as malted milk, malted cream, etc. Maltose is very laxative. One or the other of these foods will usually succeed in overcoming the constipation. In obstinate cases the administration of pure butter, as recently recommended, deserves trial.

6. "The human milk is toxic.—Drs. Saunders and Fish have reported several instances in which it was discovered that the human milk was toxic. Nevertheless even in these cases experiments should be made if by artificial feeding the irritating qualities of the mother's milk may not be altered."

Human Milk as an Aid to Artificial Feeding.—"Nothing need be said concerning the value of wet-nursing; it is undoubted. But here attention will be called to the fact that human milk can be furnished temporarily in small quantities by many mothers for other babies than their own. Let it be decided that a small quantity of human milk is desirable. In a city at least some relative or neighbor probably nurses a healthy infant and has more than sufficient breast-milk. For the sake of a needy baby, or for a small financial consideration she will rarely refuse to furnish a few ounces of milk daily. A mother who is advanced for some months in the period of lactation is to be preferred, since her milk is less liable to prove too rich in solid constituents.

"The properties of this milk are both nutritive and therapeutic. Human milk is a powerful stimulant to the digestive and absorptive functions of the gastroenteric tract. It seems also to give strength and tonicity to the vascular system; it supplies anti-toxic and bactericidal properties to the blood of the infant which struggles with some infectious process. Having these therapeutic principles in mind one can readily deduce certain indications:

1. "Marasmus.—The pathology of this disease is still in dispute, although the researches of Fenwick and Baginsky seem to show a degeneration of the epithelium lining the alimentary tract. At best it takes time to effect a cure. The proper feeding, as laid down by Rotch and others, is a food having the proteids and fats well diluted. But in all cases time and care is the important element in treatment. I have found in a few cases that the addition of mother's milk, even in small quantities, to the food very quickly changes the clinical picture to one of improvement. Or the baby may be given mother's milk

exclusively for a few days and the artificial food gradually supplied. Or the baby may take the mother's milk and artificial food alternately. The method of mixing these foods may be changed according to indications and depending on the amount obtainable. Personally I prefer to mix the human milk with the artificial food in the bottle, or still better if the baby is permitted to take the breast, let it nurse a little immediately after the ingestion of the food.

"The following is a brief history of such a case:

"J. E., aged two months, an inmate of the Bethesda Foundling Home, has progressively emaciated for one month. She now weighs about six pounds. The food administered has been cow's milk modified to the formula—proteids, 1; sugar, 7; fat, 2.

"The stools had been rather frequent, showing undigested masses. The baby was very thin and pale, yellowish in color. The skin was wrinkled, and the bones prominent; the fontanelle was depressed, the cry very feeble, and the movements slow; no fever existed.

"The infant was placed on human milk, which was obtained by manipulation from the breast of a young mother. The infant received two to three ounces every three hours for two days; it was then fed on modified cow's milk and human milk alternately for three days. Afterwards the baby received the human milk once or twice daily. In one week she gained ten ounces. Although more human milk was not obtainable, the baby did very well and is now healthy.

2. "Gastroenteric Infection.—We do not dread the infection of the gastroenteric contents so much as the malnutrition following. Very frequently after successfully ridding the infected alimentary tract of the offending microorganisms, the infant fails to thrive. The injury done to the intestinal lining is not repaired, and nutrition progressively fails. Or a severe form of cholera infantum is carried through the storm. The baby seems much better, but yet no food can be had to agree. Fever may develop and the patient succumbs to septicemia. In these conditions human milk, even in small doses, has a powerful therapeutic effect. It stimulates the diseased epithelial cells so that they again imbibe nourishment; it strengthens the body to resist the onslaught of infection.

"Given a case of acute gastroenteric infection of great severity, the ordinary measures must be instituted. The alimentary tract

should be thoroughly evacuated, and water administered in large quantities. For two or three days rice water or barley water may be safely given, but then the question of additional food arises. The answer is, add a little human milk to the rice water. Gradually increase the amount of human milk, carefully noting its effect, and if symptoms improve sterile cow's milk may be gradually substituted for the human milk. If egg water is used during the diarrhea the human milk can be added to this.

3. "Rickets with tetany.—The common cases of rickets can be successfully treated by artificial foods and some medicament; but those forms of rickets which are accompanied by great irritability of the nervous system, as expressed by laryngospasm, tetany, or eclampsia, need some other food. Here again a temporary change to human milk, or the addition of human milk to the artificial food greatly enhances the probability of cure.

4. "Scurvy.—In this disease also, if symptoms are urgent, a little mother's milk might be of incalculable benefit. In addition to fruit juices and fresh cow's milk or white of egg, a little human milk might be obtained and added to the artificial food; although I have not as yet had the opportunity to test this method, it offers theoretical advantages.

"These are conditions in which a little human milk may have a powerful therapeutic effect. But any disease which leaves the nutritive powers in a feeble state might stand for an indication for its use."

Improvement of the Mother's Milk.—As desirable as it is for the mother to nurse her child both in its interest and that of her own, there are unfortunately some mothers who must not nurse their babies and some who cannot successfully do so. Among those who must not are those who are infected with some specific constitutional diseases, particularly tuberculosis. In such cases nursing would be very likely to hasten the fatal termination and expose the child to great danger of infection. Some mothers apparently unable to nourish their babies on account of an insufficient supply, or a faulty composition of their milk are able to do so after they are subjected to proper hygienic management. Rotch,* in an extended series of cases which he narrates, presents abundant evidence that the composition of human milk may be modified and greatly improved by an intelligent regulation of the life of the mother. On this point he says:

*Pediatrics. Philadelphia. 1896.

"In all these cases of disturbed lactation we must first determine whether the symptoms in the infant are really caused by a disturbance of the milk-supply. We ascertain first whether the supply of milk is sufficient in quantity by the methods which I have already described to you. We then investigate the quality of the milk. A chemical analysis shows us whether the percentages of the different elements are (1) normal or (2) abnormal. If we find them to be normal, we know that it is not the milk which is disturbing the infant, and we must seek for the cause of the disturbance in other sources beyond the breast. If we find the percentages to differ decidedly from those of average human milk, we must determine whether it is the variation from the normal average percentage which is producing the trouble, or whether these percentages are really well adapted to the infant and the cause of the trouble is to be looked for elsewhere. This can be done only by changing the different percentages and watching the result. If we find them abnormal, we can usually determine whether it is one or several of the elements which are producing unfavorable symptoms, and we should endeavor by our treatment to change the percentages of these elements so as to correspond first to the normal average percentages, and then, if this is not sufficient, to reduce them to lower percentages than the average until the infant's digestive functions have recovered their equilibrium. We must not forget in applying these principles that the cause of the disturbance of the milk exists in some abnormal condition of the mother, whether physiological or pathological, and that we must first remove this cause or we shall fail to regulate the milk.

"A sedentary life, with abundance of rich, mixed food, provided the woman has a strong, healthy digestion, appears to increase the total solids and to decrease the water. This increase is almost always in the fats and proteids rather than in the sugar and ash; in fact, the marked variations in human milk are almost always shown in the fat and proteids, and hence our attention must almost invariably be directed to correcting these elements. This is fortunate, as we know of no special treatment, except on very general principles, by which we can alter the proportion of sugar or salts to the other constituents. A meat, or rather a nitrogenous, diet in the woman increases the fat in her milk. Our physiological knowledge also indicates that much fat eaten by the woman tends rather to lessen the fat in her milk. Hence

to increase the proportion of fat in a woman's milk we should give much meat and only a moderate amount of fat. The proteids are more difficult to deal with. They have a tendency to increase in very bad and in very rich milk. The problem which we have to solve is almost always how to decrease them, no matter what the milk is. Our knowledge, unfortunately, concerning a sure means of reducing the proteids is very limited. Practically, however, I have found that where the woman is in good health it is physical exercise which we must insist upon, preferably walking in the open air and within the limits of fatigue. A walk of from one to two miles twice daily I have found to be about what the average healthy woman in New England needs to reduce the percentage of the proteids in her milk; but the amount of exercise must be carefully regulated according to the physical capabilities of the individual.

"Bearing in mind these simple rules, and having determined, by means of an analysis or analyses, the cause of the special disturbance, you will be able to regulate the nursing period in cases where a lack of this knowledge would often necessitate weaning. You may in this way also avoid serious harm to the infant."

Holt's summary of his instruction on this subject is that:

"Poor milk is usually low in fat and scanty in quantity, while the proteids may be either high or low. Very rich milk is usually high both in fat and proteids. While the examination of the milk often gives a clue as to the nature of the variations from the normal, the causes of such variations are to be sought in the nurse's condition and habits, and removed by correcting these. Very poor milk can seldom be permanently improved unless the causes are very definite and of a temporary character. Over-rich milk can often be improved if the true explanation for it can be reached. Results are to be judged not so much by the change in the composition of the milk as by improvement in the infant's symptoms. The question is always whether the individual milk can be made to agree with the individual child. On the whole, since artificial feeding, when it can be properly done, gives so much better results than poor or doubtful nursing, I am inclined, as a result of increasing experience, to stop nursing after a fair trial—e. g., of two weeks—has been made, and begin feeding, rather than waste time in prolonged efforts to improve the breast-milk."

Weaning.—"Authorities are nearly in accord as to the proper time to institute weaning. If the child is thriving and showing satisfactory gain in weight and development, breast-milk alone is sufficient until the ninth to the twelfth month. The breast-milk may prove a great resource in cases of illness. A good indication for the administration of other food than that from the breast is the cutting of four teeth, showing that the development of the digestive tract is advancing.

"Rarely it may be necessary to wean early—at the age of five or six months—if anomalies in the mother's milk develop or if the infant is not making satisfactory progress. In the latter case it is well to add artificial nourishment to the diet, but not to wean entirely until the necessary physiological development has taken place.

"The child should not be weaned during the hot months of the year, nor during or immediately after an illness, nor during a gastro-intestinal disturbance, unless this is due to a persistent faulty composition of the breast-milk.

"Mixed feeding is preferable to insufficient nourishment from the breast, and is to be preferred to exclusive artificial feeding. The breast and bottle should be given alternately, and both breasts should be given at each nursing to maintain their secretion. (Marfan). The value of mixed feeding is universally admitted.

"All authorities are agreed that it is advisable to wean gradually; the time required for gradual weaning is from two to five weeks. For instance, Monti says to give one extra meal a day for one week, two a day during the next week, three a day during the third week, and so on. At the end of four or five weeks cease nursing altogether.

"Undoubtedly the best food with which to wean a child is properly prepared cow's milk. The child has to learn to digest cow's milk casein just as in the early months of life, but with much greater probability of success. It is safer, therefore, to begin with a high dilution of cow's milk, such as one part of milk to two parts of water, with the addition of cream if desired. If this agrees, the strength of the mixture can rapidly be increased until at the end of two weeks equal parts of milk and water and at the end of one month three parts of milk to one of water or whole cow's milk may be given. If weaning is carried out before

the tenth month, a longer time may be necessary, and for infants of weak digestion higher dilutions or special mixtures may be required. In preparing the milk mixture for weaning it will usually be found advantageous to use a starchy decoction, such as barley-water, for our diluent instead of plain water, or to add one of the reliable infant foods. This addition of starch is indicated not only to render the milk more digestible, but also to increase the proportion of carbohydrates. Again, many children do well on milk mixtures, but suffer from repeated attacks of indigestion following the administration of solid food. Starches in concentrated form, such as cakes, bread, potatoes, oatmeal, etc., will generally be found to be the articles at fault; their withdrawal and the substitution of milk and broths will usually be followed by complete recovery. The common practice of giving the infant a "taste" of tea, coffee, or alcoholic beverages need only be mentioned to be condemned. Under the following headings we have included those articles of food which may form the child's diet from the time of weaning until the end of the second year. Experience has shown that infants do best on plain food. Once the child has acquired a taste for sweets and highly seasoned articles of food it will rarely be satisfied without them; therefore it is much kinder to withhold such articles absolutely until a later period of life." *

The rate of gain in weight of the baby and the health of the mother, says Chapin,† will be the gauge as to when mixed feeding should be begun. Weaning should be gradual, and as most babies will require the help of the bottle during the latter part of lactation, it is well to begin as soon as possible in giving one or two bottle feedings each day; the baby will then be educated in its use, the mother will have more time to herself, and in case of her being ill, sudden weaning will not be necessary. If this method is employed, the change from breast feeding to bottle feeding will not cause inconvenience.

Diet after Weaning.—"After the baby has been fully weaned its nourishment may be gradually increased in strength. This applies equally well to a bottle-fed baby who has reached the usual age for weaning. By about the age of twelve months a child may be fed upon undiluted milk and may begin to take

* Judson & Gittings, *Infant Feeding*. Phila., 1902.

† Chapin. *Theory and Practice of Infant Feeding*. New York, 1902.

other articles of diet in addition, such as beef-juice, eggs, and starchy food in moderate quantity. These will be given from a spoon, but the milk may be given from a bottle as long as the child is inclined to take it in this way.

"As a guide for the feeding of a child of from twelve to eighteen months the following diet list may be of service. The numbered menus indicate the choice that the mother may have, alternating them so that the child will not tire of any:

Diet from One Year to Eighteen Months.

Breakfast (6 to 7 A. M.).—(1) A glass of milk with stale bread broken in it. (2) Oatmeal, arrowroot, wheaten grits, hominy grits, etc., made into a porridge with milk and well cooked for two hours at least. (3) A soft-boiled or poached egg with bread broken in it, and a glass of milk.

Second meal (10 A. M.).—A glass of milk.

Dinner (1.30 to 2 P. M.).—(1) Bread moistened with dish-gravy (no fat), beef-tea, or beef-juice (appendix, 22); a glass of milk. (2) Rice or grits moistened in the same way; a glass of milk. (3) A soft-boiled egg and stale bread thinly buttered; a glass of milk.

Rice, sago, or tapioca pudding, or junket, in small quantities as dessert with any of these diets.

Fourth meal (5 P. M.).—A glass of milk or some bread and milk.

Fifth meal (9 to 10 P. M.).—A glass of milk.

"It is, of course, understood that the baby does not suddenly plunge into any such diet at twelve months, but that the list and the variety are only very gradually increased, and that milk remains the principal article of diet. The last meal should be given only if the child wakens. If it rouses some hours before the time for the first morning meal, and remains awake, it should be given a cup of milk to stay the stomach until breakfast. It is no longer necessary at this age to sterilize the milk in cool weather, if care is taken to keep it carefully. In hot weather it is safer to sterilize it still.

"After the age of eighteen months up to that of two years the diet is only very little more extended. The following list will be a guide:

Diet from Eighteen Months to Two Years.

Breakfast (7 A. M.).—(1) A glass of milk with a slice of bread and butter or a soda, Graham, oatmeal, or similar unsweetened biscuit. (2) A soft-boiled egg with bread and butter and a glass of milk. (3) Porridge as described in the previous list.

Second meal (10 A. M.).—(1) Bread broken in milk. (2) Bread and butter or a soda or other biscuit with a glass of milk.

Dinner (2 P. M.).—(1) Boiled rice or a baked potato mashed and moistened with dish-gravy or beef-juice; a glass of milk. (2) Mutton or chicken broth with barley or rice in it, or "beef food"; some bread and butter, and some sago or rice pudding made with milk. (3) A small portion of minced white meat of chicken, turkey, or fish, or minced rare roast-beef, beefsteak, lamb, or mutton; bread and butter; a glass of milk.

Fourth meal (5 P. M.).—(1) Bread and milk. (2) Bread and butter and a glass of milk.

"It is probable that no fifth meal will be needed, but if it is it should consist only of milk. The term "beef food" is used here in the very general sense of some of the commercial ready-made beef preparations. Among the best are those in which the beef is already peptonized. There are a number of excellent foods on the markets, but the family physician had better be consulted regarding them. It is important to know that not every child can digest potato easily, and that this variety of starchy food must be tried with caution. Further, that many children have great difficulty in digesting any form of starch. In such cases the diet should be chiefly of animal food during the first two years of life.

"After the child has cut sixteen or twenty teeth—say, by the age of two years—we may still further increase the diet by allowing it to eat solid meat food. For dinner it may have tender chicken, fish, mutton, or beef cut small but without actual mincing. Fresh or stewed fruits in small quantity are also good, among these being included raspberries, strawberries, grapes freed from the seeds, peaches, juice of oranges, and stewed apples. Bananas should not be given. The diet then may be as follows:

Diet from Two to Three Years.

Breakfast (7 to 8 A. M.).—(1) A small portion of beef-steak, with oatmeal, hominy grits, wheaten grits, corn meal, or other cereal porridge with plenty of milk. (2) A soft-boiled egg, bread and butter, and a glass of milk.

Second meal (11 A. M.).—(1) A glass of milk with bread and butter or with a soda or other biscuit. (2) Bread and milk. (3) Chicken or mutton broth.

Dinner (2 P. M.).—Roasted fowl, mutton, or beef cut fine; mashed baked potato with butter or dish-gravy on it; bread and butter. As dessert, tapioca, sago, or rice pudding, junket, or some of the fruits mentioned.

Supper (6 P. M.).—(1) Bread and butter. (2) Milk with soda or similar biscuit or with bread and butter.

"It is very necessary to bear in mind two facts regarding these tables: First, that they are only a guide, not an absolute rule, both as to the time of meals and as to the nature of the food; and, second, that they rather represent the extreme of what a child can take than indicate what every child ought to have. Although mothers are very prone to worry because their children are not getting 'strong enough food,' there is less danger of this happening than of the food being too strong. Many a baby does wonderfully well with milk alone long after others are taking a diet somewhat like the list given for the age of eighteen months to two years. In such a case it is folly to alter the diet hastily. The weight and the general condition of the baby are far better guides than the number of months old which it happens to be or the number of teeth cut. It is always very important, as previously pointed out, to make no changes during the hot weather when it is possible to avoid doing so. On the least disturbance of the digestion, too, the diet should be cut down to milk for a day or two." *

"The infant should never be given cake or candy even to taste. I think that it is necessary to state this very decidedly, because it is an erroneous view which is held by most mothers that it can do no harm to give occasionally to an infant in its second year of life, or to a young child, a little candy or a little cake. This may be true so far as the immediate effect these articles may have on the digestion is concerned, but it is of far more importance that

* Griffith. *The Care of the Baby*. Phila., 1898.

the infant should not have its taste perverted from those articles of diet which are best for its nutrition. These new articles appeal more strongly to its sense of taste, and allow it to know that there is something which tastes more agreeable than the food which it is accustomed to have. When an infant has acquired a taste for cake or candy, it will cease to enjoy the food by which its development will be best perfected. It is, in fact, kinder to the infant never to allow it to taste cake or candy. When these articles are withheld, it will continue to have a healthy appetite and taste for necessary and proper articles of food.

"Meat as a regular article of diet for each day is not, as a rule, required until the child is between three and four years old. The kinds of meat which should be given in this early period of childhood are chicken, mutton-chop, roast beef, and beefsteak. These meats should be cut into small pieces, and a little salt added according to the child's taste. It is well, during the latter part of the third year and the first half of the fourth year, to give the child an egg on one day and meat on the next."*

"The feeding of sick infants is considered under the headings of the various diseases. It must always be borne in mind that infants and children, if left to their own resources, would take either very little nourishment or too much. In certain marantic conditions infants will take very large quantities of food if it is given to them. The infant's cries are interpreted by the mother as being due to hunger, when they may be due to colic or intestinal distention. In these cases the mother gives too great a quantity of food, and the infants suffer from dilatation of the stomach."†

"The physician should not relax his vigilance in the feeding of a child after the first year has passed. The ideas of the laity in regard to what a child can digest after it has outgrown an exclusive milk diet, are very erroneous. The majority of infants are given solid food too early and in too large quantities. Most of the attacks of indigestion during the second year are directly traceable to such gross dietetic errors. The diet of a healthy child during the second year should consist of milk, some farinaceous food, bread, a small amount of animal food—beef or mutton, beef juice, eggs—and fruit."‡

* Rotch. *Pediatrics*. Phila., 1896.

† Koplik. *Diseases of Infancy and Childhood*. New York and Phila. 1902.

‡ Holt. *Diseases of Infancy and Childhood*. New York. 1902.

"Fruits of various kinds are early allowable, such as orange juice, apple sauce or baked apple with the skin removed, stewed dried apples, and stewed prunes after the pulp has been squeezed through a sieve. These articles are not only digestible, but have a favorable action on the bowels." *

Milk Laboratories.—In recent years milk laboratories have been established to which physicians may send prescriptions for milk mixtures of any required percentages of fat, sugar, and proteids. The milk and cream used are derived from healthy cows, fed and otherwise cared for in the most approved ways. The milk from cow to laboratory is so handled as to secure the utmost degree of wholesomeness. For diluent the milk mixtures may have water, cereal gruels, or whey, or a mixture of two or all of them, and the mixture in its final form is sent out in the prescribed number of bottles for the required number of feedings in twenty-four hours, sterilized, pasteurized, or raw as the prescription may call for. This is a great convenience to the physician, and also to those families able to pay for the convenience. It is doubtful whether the establishment of a Walker-Gordon laboratory in Maine would be a success financially. The need of it is not so urgent as it has been in many of the larger cities, but the lesson of percentage thinking in the home modification of milk for infant feeding, taught so insistently by Rotch, deserves thorough mastery. The best substitute for the milk laboratory under the conditions existing in this State, is careful home modification of milk produced under intelligent and conscientious supervision.

Other Special Preparations.—The following preparations may occasionally be used with benefit to sick or healthy children. Until after the first year or two of life their use should be under the advice of the family physician.

Yolk of Egg and Dextrinized Gruel (Chapin).—Add to eight ounces of dextrinized wheat flour gruel the yolk of one fresh egg and if well borne one or two teaspoonfuls of granulated sugar. Composition about 1.5 per cent. fat, 1.5 per cent. proteids, 4 to 7 per cent. carbohydrates. These egg mixtures may be heated up to 150° F. without coagulating, hence they may be given warm if desired.

Junket (Starr).—Milk, 1 pint; essence of pepsin (Fairchild's), 2 teaspoonfuls. (Wine of pepsin or liquid rennet may also be used.)

* Chapin. *Theory and Practice of Infant Feeding*. New York. 1902.

Heat the milk just to a temperature that can be readily borne in the mouth, and add, with gentle stirring, the curdling agent; allow to stand until firmly curded, and serve with sugar, nutmeg, or cream as desired.

Junket and Egg (Starr).—A good custard may be made by adding two eggs, beaten to a froth and sweetened with four teaspoonfuls of sugar, to the pint of milk, and then curdling with essence of pepsin. It is well to pour this, when prepared, into coffee cups, one of which will be enough to serve at a time.

Scraped Beef or Beef Pulp (Chapin).—Get a piece of steak perfectly free from taint or sliminess, which is caused by bacterial decomposition; with a tablespoon scrape the meat until nothing but fibre remains. The pulp may be salted and broiled slightly, or fed raw.

Beef Juice (Chapin).—1. Slightly broil a thick piece of steak that is free from the slightest trace of taint or sliminess; cut in small pieces and press in a clean meat press or lemon squeezer. The yield of juice is not large. 2. Cut the meat into small squares and just cover with cold, slightly salted water, and set on ice for several hours. Then press by squeezing in a piece of cheesecloth.

Meat Broths (Chapin).—Take one pound of lean mutton, veal or chicken with some cracked bone and cut into small squares; add one pint of cold water, heat gently and allow to simmer for several hours; remove all the fat. On cooling these broths will gelatinize. These broths, especially when thickened by the addition of flour are highly nutritive.

Rice Milk (Starr).—Rice, 2 tablespoonfuls; corn starch, 1 teaspoonful; milk, 2 pints.

Boil in a farina boiler until each grain of the rice becomes saturated, and the whole creamy in color.

Rice Pudding (Starr).—Take three ounces of rice, and swell it very gently in one pint of new milk. Let it cool; then stir into it one ounce of fresh butter, two ounces of pounded sugar, the yolks of three eggs, and some grated lemon rind. Pour this into a well-buttered dish, but do not quite fill it, and then lay lightly over the top the whites of three eggs which have been well beaten up with three tablespoonfuls of sifted sugar. Put the pudding directly into the oven, the heat of which must be moderate, and bake it for about twenty minutes, or till the egg crust has become lightly browned.

Oat Jelly (Rotch).—Two ounces of coarse oatmeal are soaked in a quart of cold water for twelve hours. The mixture is then boiled down so as to make a pint and strained while hot. On cooling, a jelly is formed. Keep on ice until needed.

Hominy Grits (Starr).—Two tablespoonfuls of hominy having been boiled soft, are rubbed up with butter until quite light; then, half a pint of boiled milk is added slowly, with constant stirring; next strain through a sieve and boil again; flavor with sugar or salt, and serve hot. Rice may be prepared in the same way.

Flour Ball (Griffith).—Tie 1 pound of flour tightly in a bag and boil for ten hours. After it is cold take it out of the cloth and dry it for ten hours. Then peel off the outside coat of dough. The hard ball which remains should be grated when needed and mixed with milk in varying proportions: 1 or 2 teaspoonfuls to 8 ounces of diluted milk is generally sufficient. Useful in some cases of delicate stomach.

Flour ball has for long been a favorite dietary prescription in infant feeding, frequently from the conviction that the heat partially dextrinized the starch. The temperature of boiling water, however, is insufficient to transform the starch into dextrine and there is probably no such change in this preparation.

INFANT FEEDING. PART II.

PRODUCTION OF MILK FOR INFANT FEEDING.

It is proposed to present a more explicit statement of some of the conditions which make the milk supply dangerous to infants,—conditions which may and should be guarded against by the dairyman who wishes to furnish good clean and safe milk for infant feeding—and to offer suggestions for the avoidance of these detrimental conditions. Some of the conditions which render the milk supply detrimental to the child relate to the cow and the care which she receives, and some of them are due to faulty methods of milking and handling the milk.

Breeds of Cows.—Those who have considered carefully the question of breeds of cows for the infant's dairy agree that the Jersey and the Guernsey should be excluded. Their close in-breeding and their removal from the comparatively equable climate of their Channel home to a more rigorous climate render them, it is asserted, peculiarly susceptible to tuberculosis and other constitutional diseases. But a still more serious objection is that their milk has too large a percentage of fat not so finely emulsified as that in the milk of the common breeds. Jersey and Guernsey milk has also the disadvantage of containing a slightly greater percentage of proteids than the milk of other cows. The finely developed organization of the Jersey moreover, renders her milk more liable to harmful disturbances from nervous excitement.

Rotch enumerates the Durham, Devon, Ayrshire, and Holstein breeds as unobjectionable sources of supply of milk for infant feeding although the proteid percentage of the pure Holsteins is a little higher than the others.

Feed and Care of Cows.—"It is apparently one of the strange phases of human perversity," says Dr. Brush,* an experienced dairyman, "that the animal that supplies the human race with the highest type of food—milk—should receive the least care and

attention in regard to her food. Visit any dairy farm and you will find the horse-stable clean, the animals well and dryly bedded, curried daily, and fed with the best hay and oats. No refuse for these animals. But the cow you will usually find in a dirty stable, scant bedding, receiving no attention by the way of currying, and if there is any kind of refuse to be bought in the neighborhood, this is deemed good cow feed, whether it comes from the breweries, distillery, glucose or starch factory; and, in fact, all the refuse from the preparations of grain is classed as good cow food. She is pastured usually on land that cannot be tilled, and the exception is when the cow receives any sort of rational care. The cow is entitled to the best food that is procurable, and unless she gets it we have no right to expect good milk from her, no matter what her other conditions may be. She deserves the whole grain; in corn she should not receive only the refuse that is left in starch and meal mills, but the entire result of the grist; and the same with oats, hulls and screenings are not good enough to produce good milk. About the common sorts of refuse used I will say nothing, because we all know that they are improper."

Again, when speaking of the production of milk for infant feeding, he says of the cow, that "she should be stall-fed at all seasons when supplying milk for an infant. Her fodder should be fresh hay the first thing in the morning, after the milking give her a breakfast of cut hay wetted and mixed with one pint of cornmeal, two quarts of bran, one pint of oil meal, one ounce of bone meal, one ounce of salt. She then should be curried and turned out for exercise into a yard where there is abundance of clean water. At noon she should have half a bushel of cut-roots, either carrots, mangel-wurtzel, or ruta-bagas. After milking in the evening give her the same allowance that was given at breakfast."

Detailing the methods of care and feed for cows which supply milk for infant feeding, particularly the methods which govern the management of the cows which furnish milk for the Walker-Gordon milk laboratories, Dr. Rotch says:

"A cow whose milk is to be used for purposes of infant feeding should be properly housed and well cared for, as the domestic cow

*"Milk." New York. 1898.

is an animal peculiarly sensitive to her surroundings, and her product is correspondingly liable to be thrown out of equilibrium.

"The food should be kept where it cannot be contaminated. The manure should be as carefully removed from the barn as if it were a human dwelling. The cow should have freedom for her head and limbs in wide stalls all the year around. Large, dry, sunny exercise-yards should be provided for her. Her food should always be brought to her and selected with great care. Pure water should be provided, and suitable cups or troughs containing running water should be in her stall. The bedding should be fresh and free from mould or from any soil productive of bacterial growth. This can be accomplished best by means of sand or dry soil constantly changed at least twice a day. Methods should be used to get rid of all the usual foul odors and free ammonia so commonly produced in barns. Cows should be carefully guarded against fright, the worrying of dogs, and unusual excitements of all kinds, which cause serious disturbance of the lacteal functions of domesticated cows.

"The feeding of the cows of this farm has for its object the production of an even, nutritious, digestible milk and the careful avoidance of over-stimulation of the lacteal secretion. For this purpose a somewhat wider ration than that employed for the production of milk to be used in butter-making, but somewhat narrower than that employed for the production of beef, has been found to be the best adapted.

"The ratio which has been demonstrated to produce the best milk for infant feeding is the mean between these two,—namely, one nitrogenous part to five and a half or six non-nitrogenous parts. A constant use of this ratio in the combinations of many fodders and grains appears to have produced a reasonably large supply of milk with fair richness, but without over-stimulation such as would be shown by a disturbance of function. Nitrogenous foods for cows are the leguminous groups of grasses and plants, such as the clovers, lucern, beans and peas, vetches, and other plants of like kind. Besides these fodders we have for nitrogenous foods suitable for producing milk for substitute infant feeding, such grains as wheat-bran, oil-meal in small quantities, and pea- and bean-meal. Of the non-nitrogenous fodders the principal ones are maize-stover, the hays from timothy, red top, orchard grass, Johnson grass, rye grasses, the bents, Ken-

tucky blue grass, June grass, and oat straw. Most of the grasses in a green state afford a fairly balanced medium ration for substitute feeding. Of the non-nitrogenous grains the most suitable is maize-meal. We also have oat-meal and barley-meal, which contain less of the non-nitrogenous elements than the above, but still must be classed with them. The exact chemical analysis of any one ration used for feeding cows for our purpose must be carefully considered in accordance with the ratio of the digestible nutrients of the food, and this must of course be arranged practically from the recognized food tables. A great variety of food is necessary in feeding cows, but in the transition from green foods to dry, or the reverse, much care is needed to graduate the change, as disturbance in the equilibrium of the mammary gland is rapidly followed by injurious effects on the consumer. In past times, before I could rely as I do now on this carefully-managed change of rations, the spring of the year with its flush pasturage and the fresh grass following the autumn rains were fruitful sources of infantile digestive disturbance in my nursery practice."

Pasturage and green forage for cows should be free from noxious weeds, for they often render milk dangerous to infants and sometimes produce serious results in adults. All feed for cows, whether hay, provender, or green forage should be in good bright, clean condition.

The deleterious effects of feeding children with milk from cows which have been improperly fed is shown by the account which Dr. Alt * gives of an epidemic of diarrheal disease which occurred in two orphan asylums in Germany. They were some distance apart, yet suddenly in one night, 24 of the 74 boys in one building, and 19 of the 66 girls in the other were attacked with severe diarrhea with some cases later. A careful investigation of the matter indicated that the trouble was due to feeding spoiled clover to the cows which supplied the institutions with milk. Sources of infection other than the milk were excluded, and other explanations of the milk poisoning—tyrotoxicon or other putrefactive products of milk, change of fodder, or poisonous plants in it, disease of cows—were also excluded.

Diseases of Cows.—Healthy cows only can yield milk which is wholesome and free from danger to children. Even a temporary

* *Deutsche Med. Wochenschr.*, XXII., 70, 1896.

disturbance of the healthful condition of the cow, or even undue excitement of her nervous system may so change the character of her milk as to render it dangerous to the child. Doubly dangerous are those specific diseases which, aside from the systemic disturbances which they produce in the cow, communicate infectious qualities to the milk. In such connection tuberculosis is the first disease presented to the mind, but there are others.

The question of the degree of danger of the communication of bovine tuberculosis to human beings has lately given a fresh impetus to discussions and investigations. Meanwhile the only safe way is to exclude from the milk supply the milk of all cows which react to the tuberculin test, and this method of weeding out tuberculous cows is never omitted in the model dairy, which furnishes milk for infants.

Gargety Cows.—The inflammation of the lacteal glands and ducts of the cow known as "garget" is a rather common occurrence in cows cared for in the usual way, particularly when grazing in pastures which have an abundance of brush, knotty logs, and stumps which facilitate bruises and abrasions of the udder and teats, or when the cows are stood closely in the unpartitioned tie-up where the teats or udder of a cow lying down may be trod upon by the cow at the next stanchion. Even when the inflamed and indurated lobes of the udder, and the stringy, lumpy, and pus-laden condition of the milk makes its unsuitability as food apparent, it is too often not rejected, unless too bloody. The reason is two-fold: the conscientiousness of the dairyman, when it is a question of throwing away that which will sell, is not enough above that of the average mortal, and, again, he is usually unaware of the dangerous qualities of such milk. Even the milk from those quarters of the udder which are not inflamed, and which appear to be normal, is not usually so when the inflammatory reaction is severe in the diseased portion, for upon testing with litmus paper it may be found to be decidedly acid. Four ounces of such milk, apparently normal, was given to the child of a dairyman of an investigating turn of mind. "This was five o'clock in the evening. The child fell asleep, but was awakened in two hours, crying apparently with stomach-ache. She was kept awake till past midnight, and a large quantity of gas was voided *per rectum*. The next day the bowels were slightly disturbed. It is easy to imagine

if four ounces had this effect, what would be the condition if the child had been fed continuously on such milk."

Colostrum.—For a while after calving the secretion from the udder of the cow, called colostrum, is very different from normal milk. Its composition, as determined by analyses made at the Vermont Experiment Station, is:

	Total solids. Per cent.	Fat. Per cent.	Sugar. Per cent.	Casein and albumin. Per cent.	Ash. Per cent.
First milking.....	19.37	8.86	2.40	11.44	1.67
Second milking.....	14.33	2.92	3.60	6.49	1.33
Third milking.....	12.96	2.58	4.16	5.01	1.23
Fourth milking.....	13.92	3.71	4.28	4.71	1.24
Three weeks after calving.....	13.52	4.60	5.00	3.84	.58

This secretion during the early lactation period of the cow can have only a harmful effect when fed to infants. Its unsuitability for such use was set forth a few years ago by Dr. Brush, of Mount Vernon, N. Y.:

"From what I have seen of the dairies in Westchester county, and from what I have learned by conversations with dairymen, I am convinced that the greatest cause of disease among infants in New York city actually arises from the use of diseased milk, and the mixture of colostrum with sound milk. This is a most serious and important subject, and utterly neglected by the law. Calves taken immediately from their mothers, 'bob-veal,' is denounced because it produces disease in his majesty the adult citizen. But no law prohibits the wholesale administration of colostrum to the luckless infant. In none of the numerous works that I have consulted, either scientific or intended for farmers, have I found any allusion to this evil. Thus, even the conscientious man has no warning and no guide. Many of the milkmen informed me that the third milking after calving was considered fit to mix with other milk. In the course of conversation I casually inquired what effect the third milking would have on a calf three months old. The farmer innocently replied, 'It would probably give him the scours.' This disease in the calf corresponds to cholera infantum. Last summer I attended

a child suffering from cholera infantum. I proposed to give it whey, and to produce it I took some of the milk on which the child had been fed, and attempted to coagulate it with rennet. I failed utterly. I threw the specimen away and sent to the same place for some more milk. The same result ensued. I then left out the rennet and boiled the milk. It coagulated on boiling. As this is what takes place in colostrum, the cause of the attack was plain. By changing the diet the child recovered. This would be an easy test if it were not for the fact that the colostrum is mixed in most cases with a large proportion of milk, and hence only negative results would be attained. In regard to the time when milk is fit to use after calving, I am undecided, as I am still engaged in the investigation. If I succeed in interesting medical men to procure legislation on this subject, I shall be able to give definite and scientific rules. I will say here that, according to Lehman, colostrum corpuscles remain till the third or fourth day, and occasionally to the twentieth day, and as a general rule return when any disease supervenes after delivery, or in case the mother is attacked by any acute affection. Colostrum becomes acid more rapidly than milk, and contains less sugar. Let me beg of you not to forget this matter; we owe it to the community to protect their children."

Ovulation.—Another condition of the ordinary cow which is pretty sure to impart to her milk qualities which are deleterious to the infant is the excitement during the period of ovulation. The following is the history of a case of milk poisoning due to this condition and abusive treatment:

"A woman, the owner of the cow, came and attempted to drive her home, but could not do so. Then her boy, a lad of ten, armed with a big stick, came and pounded the cow considerably, but without separating her from the herd. Finally, the old man made his appearance, carrying in his hand a heavy whip. He walked up to the cow, gently holding out his hand as if to feed her, and when close to her laid on the whip quite severely, with the effect of calming her immediately. She trotted for home, he running behind her, giving her a blow every time he came close enough. When she was in the yard, a small enclosure, he beat her for several minutes, and after she was in the stable I could hear an occasional blow. This all occurred

before milking time. I was deterred from making an attempt to prevent this cruelty, because of the opportunity thus presented to observe the effect of milk from a cow thus treated, in the feeding of children. This occurred in my own immediate neighborhood, and I knew that if any children were taken sick I would hear of it. As soon after the occurrence as possible I called on my friend, Dr. Campbell, and related the affair to him, asking him to find out who received milk from the cow, as the owners were patients of his. On Sunday evening he was called to see a child, eight months old, who had been attacked on Saturday night with sharp pains. It had been kept awake all night; it had suffered mild attacks of diarrhea during the summer, but had never before been disturbed during the night, the attacks always passing away with treatment. This attack, besides keeping the child awake, was accompanied by constant vomiting, which had not characterized any of the previous attacks, and there had been eighteen movements of the bowels in twelve hours, mostly green and undigested milk, an occasional discharge of dirty, mud-colored, watery and offensive material. The child was very sick, and developed profound symptoms of *cholera infantum*. The doctor inquired on what the baby had been fed, and the answer was, "The bottle, with the milk of one cow." On further inquiry, he learned the milk had been procured from the above-related cruelly abused cow. The child recovered because the poison was stopped, although he was sick for several days.

"This accidental observation is not an unusual occurrence; it, or something like it, is happening every day, though we may not be able to follow it up so closely."*

Dr. Brush goes on to relate the following cases of acute milk poisoning, arising from causes not discovered, but which he deems interesting, as illustrating this condition:

"On a Sunday afternoon a friend of mine called me hurriedly to see his child, a baby ten months old, and bottle-fed. As he thought it was dying, I obeyed, and was soon at the house. On my arrival I found the child in a profound tonic convulsion. I learned from the parents that I was called in the absence of their regular physician, who had seen the child three hours previous. The sickness had commenced the day before. When this physician had seen the child that day, he inquired on what it was fed,

*Brush, "Milk." 1888.

and was told 'milk and one of the patent foods.' He approved of the diet, and left some medicine. The parents had no idea the child was very sick, so they fed it, and it went to sleep. They went down to dinner, but returning afterward to the room where the baby was, they found it struggling in a convulsion—the convulsion it was in when I came. I immediately wrapped the child in a cold, wet blanket, and endeavored to get a little brandy into its mouth, abstaining from any other treatment, as I knew the attending physician would be in immediately. He came a few minutes after my arrival, when I surrendered the case to him. The father wished me to stay, and I did so, simply watching the case. When the child was recovering from the convulsion it vomited several large masses of solid caseine, and its bowels were moved several times. When the convulsion had completely subsided I took my departure, but was again called between 6 and 7 in the evening. When I reached the house the child was dead.

"On the next day (Monday) I was called to see a child, nine months old, bottle-fed, who received his milk from the same farm, and had been suffering from a severe diarrhea since the preceding Friday. I found the child very sick, vomiting and purging. The alvine discharges were mostly green and watery, occasionally mud-colored. I directed that he should receive no milk under any circumstances whatever, but be fed on beef solution and oatmeal-water, and receive every hour a teaspoonful of the following:

"The next day I found there had been no abatement in the number of movements of the bowels, but there had been no vomiting. I changed his food to kumyss and he required no further treatment till two weeks later, when I put him on other food simply for economy. He has continued to do well ever since. Is there any reason why we should not call these cases 'milk-poisoning?' One with treatment and a continued use of the milk died; the other, with no treatment to speak of but stopping the milk, made a good recovery."

Spayed Cows.—To obviate the dangers and disadvantages which have been suggested under the last two subheadings, and also as a safeguard in large measure against those forms of inflammation of the udder, or garget, not of traumatic origin, Dr. Brush believes that the separation of the functions of breeder

and dairyman is the first reform to be recommended. All the cows used to supply milk for food, especially for infant food, should be spayed, thus eliminating many of the common and constantly occurring disturbing conditions that perniciously affect the milk and otherwise vastly improving it. He adds:

"This is not surmise, but is in fact a demonstrated truth. I have in my own dairy several spayed cows, whose milk is used for infant food, and I have been obliged during the past summer to send milk directly into dairy communities so far from me that the milk cost the receiver seventy-five cents a quart. Communications from these people express surprise at the beneficial results of the milk I send them, being themselves right in the midst of dairy cattle and everything, to their observation, betokening health. Many of them imagine that I prepare the milk in some way. I only introduce this bit of personal experience, in order to reiterate that the milk is only pure normal secretion from animals that are removed from the danger accompanying these conditions.

"I have in my herd one cow spayed four years ago, the first one on which I operated; she is giving as much milk to-day, if not a little more (about ten quarts) than she was before the operation. She never has been sick a day and is very quiet, never excited from any cause, in good condition of nourishment and promises to remain a useful animal for years to come. This same description applies to all my spayed animals. There is hardly a cow in my herd among the animals not yet spayed that I have not been obliged to throw away the milk of for days at a time, owing to injuries, indisposition or like causes; but among the spayed animals, I have not known of one being injured by the horns of their fellows, the most common source of injury among dairy cattle, because they are so quiet and keep by themselves that they are not subjected to the ferocity of their companions."

Bacteria in Milk.—Aside from the dangers to the infant which have been enumerated there are those which are chargeable to the owner of the cow instead of to the cow herself. In all discourse of late years on the production of good, wholesome milk, bacteria are prominently in evidence. Bacteria are often differentiated as injurious and beneficial, but in the milk for infant feeding the presence of an excessive number of bacteria of any

kind is undesirable. Aside from the infective action of the germs which are the essential causes of communicable diseases, another class, omnipresent in the ordinary dairy, are undesirable because their presence excites changes in milk which make it dangerous to infant consumers. In the following subheadings the sources of this bacterial invasion of milk and the means for reducing it to the minimum will be considered.

Sources of Bacterial Infection and its Dangers.—The ways in which milk may be seeded with bacteria are so numerous that in this competitive age, the milkman, in his own interest must make himself familiar with the best methods of excluding bacterial infection and of producing milk of good quality as well as milk in ample quantity. If anything, his legitimate and usual instructors, the dairy journals and the agricultural experiment stations, excel the physicians in their insistence on this point. The key-note to success in the production of good, pure, and wholesome milk from healthy cows is *cleanliness and low temperature* and the failure to produce milk which meets the approval of physicians and sanitary officials, and which is suitable for infant feeding is due to careless and uncleanly methods. Dirt in milk is undesirable enough for esthetic reasons, but the invariable accompaniment of filth is a large excess of bacteria which bring about changes in the chemical composition of the milk, thus making it dangerous as a food for infants. The sources of the bacterial infection of milk are various, and they and the means of guarding the milk against contamination will now be reviewed.

Stables and Stalls.—The milking should be done in a clean and dustless atmosphere, by clean persons and in a cleanly way. In the absence of these essential conditions of cleanliness the milk is contaminated by the absorption of evil odors and by receiving bacteria-laden dust and dirt from the atmosphere, from the cow, and from the milker. It is entirely practicable to have the stable and stalls so arranged and cared for that they shall contribute their due part in insuring cleanliness of the milk supply. At the time of milking and before, great care should be taken not to raise a dust. A feeding of hay just before milking fills the air with dust and increases enormously the number of bacteria falling into the milk. "The milk from each of twelve cows in a stable showed a low bacterial count, except from one

which stood next to a pile of dry feed; her milk contained one million bacteria to the cubic centimeter.”* Again, Dr. Russell of the Agricultural Experiment Station of Wisconsin exposed a gelatine plate in the stalls during feeding and found that over 160,000 organisms a minute were deposited on an area the size of an ordinary milk pail.†

The Cow.—From the udders and sides and thighs of cows which have been plastered with manure a continual shower falls into the milk pail of the slovenly milkman which ensures the usual myriads of bacteria found in dirty milk and accounts for the “cowey” taste of such milk. Stalls such as meet the approval of the best dairymen make it almost impossible for the cow to soil herself when lying down. Whenever this occurs the soiled parts should be carefully washed before the milking is begun. Ordinarily the only preliminary cleansing required is a careful brushing of the udder, abdomen, and sides with a piece of damp burlap, preferably a little while before the milking is begun. In one set of experiments 20,600 germs per cubic centimeter were present when the cow was cleaned before the milking, and 170,000 were found when the preliminary cleaning had been omitted.‡

“Milk from four *dirty* cows in a clean barn with clean milkers gave an average of 90,000 bacteria to the cubic centimeter. Milk from four other cows of the same herd, carefully *cleaned* and milked by the same man, gave an average of only 2,000.”

The Milker and the Milking.—Clean milk does not come from the milk pail of a dirty milker who wears dirty, dusty clothing. In model dairies, before the milking the milkers slip on suits of white or colored duck or drilling which are kept clean and in places where they do not collect dust. Before beginning the milking the milker should wash his hands and in all practicable ways guard the milk against dust and dirt. He should never wet the cow’s teats with milk. Dry milking should be the rule, though the application of a small quantity of clean vaseline is sometimes an advantage and is permissible. Before milking

* Report of the summer work of the Milk Commission of the Medical Society of the County of New York.—Quoted from Dr. Chapin.

† Rpt. Wisconsin Exper. Station. 1894.

‡ Backhans—Quoted by Judson and Gittings.

into the pail is begun, a small quantity should be milked into a special dish and thrown away, or at least it should not be mixed with the milk to be sold. The reason for this is that the fore milk (that which is first drawn) contains an abundance of bacteria, but that which is subsequently drawn usually contains comparatively few. Dr. Austin Peters, veterinary surgeon of the Massachusetts Cattle Commission, and Dr. A. K. Stone made some experiments in milking some of the cows in the Walker-Gordon herd, to determine whether it is possible to obtain a practically sterile milk at any stage of the milking.

"Dr. Peters was dressed in a freshly-boiled suit and cap, and had his hands and arms thoroughly washed with a 1 to 1,000 bichloride of mercury solution. The cow's udder, teats, flanks, sides, groins, and abdomen were washed with the same solution, and dried with a freshly-boiled cloth. The milking was then done by Dr. Peters into bottles which had been carefully sterilized at the bacteriological laboratory, with the following result:

"Of the four cows milked for this experiment and selected without special choice, the bottle marked 1 in each of the following sets of figures in this table represents the milk of the first half of the milking and drawn by the hand of the milker directly into the sterile bottles. Number 2 in each set of figures represents milk drawn through a sterile canula directly into the bottle, while Numbers 3 and 4, respectively, represent milk drawn by hand after more than one-half of the udder had been emptied. A bacteriological examination of the milk in these bottles, by Dr. A. K. Stone, gave the following results:

	Colonies.	Colonies.	Colonies.	Colonies.
1	141	167	19	53
2	0	0	1	2
3	0	6	0	0
4	0	0	1	2

"The results of Dr. Stone's examination showed, first, that the milk obtained from the first half of the milking contained a comparatively large number of micrococci and fine bacilli of the same general appearance respectively; second, that the milk drawn through the sterile canula was practically sterile, and that the milk drawn in the second half of the milking by hand was so uniformly sterile as to awaken the suspicion that the isolated

colonies might have been the result of the manipulation between the 'cow and the plate.' ”*

Again, in experiments made at the Wisconsin Agricultural Experiment Station, the milk drawn first was kept separate in a sterile flask, and was found to contain 2,800 germs per cubic centimeter, while the milk drawn later averaged only 330 germs.

Utensils and the Care of Them.—It requires some instruction to make the ordinary person, even the cleanly person, comprehend that although a milk pail or a milk can which presents neither to the eye nor to the nose evidence of uncleanness, may nevertheless be far from being bacteriologically clean, and may be capable of starting a rapid bacterial fermentation of milk put into it. The proper way to cleanse utensils is first to rinse them thoroughly in *cold* or only moderately warm water to remove the milk adhering to them, some traces of which would be coagulated and firmly attached to their surfaces by the action of hot water. They should then have a careful washing in rather hot soapsuds or a solution of washing soda,† with clean cloths that have been boiled, and with hands that have been made clean before washing the utensils. The final stage of the cleansing should be their immersion in, or their filling with, clean boiling water, or still better their sterilization with steam when facilities for its use are available. The cans, pails, and other utensils thus cleansed should be kept bottom side up in a clean and dustless place until they are again used.

The influence exerted upon the number of bacteria in the milk by the character of the milk pails and other vessels and the care with which they are cleansed is shown by the following experiments:

Milk in enamelled vessels, contained 1,105 germs per cubic centimeter; in tin vessels, 1,690; in wooden vessels, 279,000.

Milk in washed vessels had 28,600 germs; in vessels washed and then sterilized, 1,300.

Fresh milk had 6,660 germs; that which had passed through six vessels had 97,600. ‡

* Rotch. *Pediatrics*, p. 221. Philadelphia, 1896.

† Recent experiment station investigations have shown that washing soda, or sal soda, is a very efficient germicide.

‡ Backhaus, quoted by Judson and Gittings.

Milk drawn into a sterilized vessel was found to contain 520 bacteria, but when drawn into a flaring pail, with considerable disturbance of the udder and bedding, the number rose to 30,000.*

Again, with an ordinary milk pail and strainer the bacterial count was 80,000; with sterilized pail and strainer the same day, in the same barn, and with the same cows, 5,000 bacteria were counted.

Wood, pulp, or galvanized iron are unsuitable material for milk pails or other vessels for the reception of milk. Tin is much superior. The wide mouthed milk pail is objectionable for admitting too much dirt to the milk. If such pail is used a large part of its top should be covered with a piece of cheese cloth held in place with a long rubber band or string. The cheese cloth should be sterilized by boiling between milkings. The milk pail with a wire strainer attached is not easily cleansed and sterilized and should therefore not be used. Some dairy-men have the whole top of the milk pail covered with a strainer through which they milk into the pail, believing that by thus excluding stray particles of matter from falling into the pail the milk is polluted in a lesser degree. It is doubtful, though, whether particles of dirt floating upon the foam which covers the milk in the pail are so thoroughly macerated and dissolved as when subjected, upon the surface of the strainer, to the continuous pelting of the descending streams of milk.

Straining.—As soon as a pail is filled with milk it should be carried from the barn to a clean milk room and strained. Left standing in the tieup the great absorptive capacity of the milk taints it with undesirable tastes and odors, and bacteria continue to fall into it. To escape all this and the continued maceration of chance particles already in the milk, immediate straining should be the rule.

Aeration.—The next thing is the aeration of the milk which should be done as soon as possible after it is drawn. The reason usually assigned for the aeration of milk is the removal of undesirable tastes and odors. If that were the only reason, there would hardly be the necessity for the aeration of the milk designed for infant feeding which is drawn from healthy cows, and those which have proper feed and care. But milk after it

* Conn. Bulletin No. 25.

is drawn is liable to infection with many kinds of germs the development of some of which is favored by the presence of oxygen, and some of which flourish the better the smaller the trace of oxygen in the milk. It happens that those germs which produce the most toxic products are those to which oxygen is inimical. There is therefore a reason why milk should be made to exchange so far as practicable its carbonic acid gas for the oxygen of the atmosphere, and as freshly drawn and warm the diffusion of gases from and into the milk is much more rapid than after cooling, the reason is evident why immediate aeration is required, and why the air of the milking place should be free from obnoxious odors. Strictly then to gain the best results, aeration should precede cooling, but with all the other steps unobjectionable in the production and handling of milk, there can be but little reason for complaint against the dairyman who prefers to combine aeration and the first step in the cooling of his milk.

Cooling.—Immediately after the aeration the milk should be bottled and cooled down to 45° F. and kept as near this temperature as possible until it is delivered into the care of the families where it is to be used. In the transportation of the milk the rising cream should be disturbed by jolting or otherwise just as little as is possible.

The addition of chemical preservatives, particularly to milk designed for infant feeding, can be characterized as nothing less than criminal. Their presence in milk is very good evidence of a dirty dairy and careless and incompetent methods of handling the milk. The use of chemical preservatives is wholly unnecessary. The multiplication of bacteria in fairly clean milk cooled promptly to 45° or 50° F. is very slow indeed.

Milk which had 3,746 bacteria when freshly drawn had 270,000 bacteria in 15 hours when kept at the temperature of 80° F., and had an innumerable number and was coagulated in 27 hours. The same milk kept at 50° F. had only 3,634 in 27 hours, and was still sweet with only 12,740 bacteria in 72 hours.*

Bottles or Cans?—The delivery of milk in bottles is the best and cleanest method, and the only way in which it should be delivered for the use of infants. The bottles should be filled as

* Bulletin 208. Cornell Univ. Agric. Experiment Station.

soon as possible after the milk is drawn, they should be capped to prevent the deposit of dust within the lips of the bottles, and then cooled. Before refilling, the bottles should be washed and sterilized to guard against the transmission of infection from house to house.

A Model Dairy.—The following is a description of a dairy which may serve as a model for other persons who wish to produce milk of the highest degree of excellence:

Up near Dover Plains, N. Y., is a small barn with freshly whitewashed doors. The doors are a signpost for a regime of cleanliness which makes the barn an object of interest in the surrounding country.

Within, the walls are whitewashed, the floor strewn with lime and lime, and the roof of the loft is covered with terra-cotta cartridge paper. The manure gutter is clean and dry, and in the stalls a litter of fresh straw is covered with dry leaves. As a result of such care there is no odor, and the cool, clean barn appears like a fit habitation for such tender animals as cows—cows, moreover, that are expected to produce pure, healthful milk.

This model barn brings up the story of how a farmer, without the advantages of large milk producers, and assisted only by his wife, is able to send to New York milk that has run as low in bacteria as 300 to the cubic centimeter, and even in winter shows only one or two thousand. This is doing from fifteen to thirty times better than the standard required for certification by the milk commission of the County Medical Society.

Several months ago, when the Rockefeller Institute began to co-operate with Prof. William Hallock Park in his work of improving New York's milk supply, a trained laboratory worker, under the direction of Prof. Park, visited the farms in Dover Plains. Encouraged by his New York dealer, a public spirited citizen and a practical philanthropist, one farmer in particular began with right good will to follow the suggestions of the professor's assistant.

Coming from a bacteriologist well informed as to causes of contamination, and fortified by the experience gained from visiting many farms, these suggestions were very practical ways of keeping the bacteria out of milk. The barn, the animals, the utensils and the methods employed were scrutinized, and possible improvements were pointed out. A visit to the place and

observations of the daily routine will illustrate what has been accomplished by the cordial co-operation of the farmer and scientific worker.

The barn has been described. The tenants of it are out for their daily airing, which always takes place during the sunny hours of the day. In an adjoining field they may be seen, a round dozen of plump, well-groomed, milch cows—Jerseys, most of them, with a mouse-colored Alderney, a Guernsey, an Ayrshire, a Holstein and a strongly marked Dutch belter.

At a glance at the cows one is struck by the marks of care and good condition, the entire body free from dirt, the sleek hide, trimmed tail, and gleaming udders. The good treatment they receive shows in their gentle ways, for, like pets, they want to make friends with visitors.

When the airing is over and in preparation for milking time, they are enclosed in the barn, fed their ration of grain, and left for several hours, warm, cosy and rested.

The cows attended to, the farmer repairs to his dairy room. This is a separate building, isolated from the homestead, and a model of cleanliness that puts to shame many a home kitchen. Made of fresh pine boards, its sweet, clean odor is reminiscent of an Adirondack cabin; and its spotless floor and walls are proof of the scrubbing administered after each bottling. To one side is an aerator, a hollow, conical-shaped affair, its interior heaped with ice, while without it is wrapped in folds of clean cheese cloth. Around the room extends a shelf, studded with upright pegs on which are placed the cleaned, sterilized bottles. Near by, in covered boxes, are stored the pasteboard and stencil certificate caps, and also, when not in use, the milking pails.

When milking time arrives, the farmer's first duty is to adjust the throat latch, which is designed to keep the cows, once cleaned and ready for milking, from lying down. His throat latch is simple and effective, nothing but a cord attached to the stall posts, and looped under the head of the animal.

Then the cows are cleaned, their flanks receiving especial attention, and, most important of all, the udders being thoroughly washed. Next the farmer prepares himself for the milking.

His working clothes are discarded for a fresh sterilized milking supply, the hands and arms are washed with soap and water,

and, lastly, the fingers rubbed in vaseline. This last act is a very important one, for the vaseline softens and moistens the fingers, thus removing the necessity of using the foremilk, which, having collected in the teats, is heavily charged with bacteria.

Ready then for milking, the farmer on his way to the barn stops at the dairy room and secures his milking pail. This is an upright, narrow can, with an eight-inch opening at the top, and provided with a tight fitting cover. Arriving at the barn, he carefully hangs the cover on a hook, and then, holding the pail at an angle of 45 degrees, milks a cow. Milking a cow by a skillful milker requires but five minutes, and the pail is immediately covered and carried to the dairy room, where the bottling takes place.

As soon as one cow is milked the bottling begins. Previously the aerator was filled to the brim with ice, and the pasteboard caps sterilized in a pan on a small stove. The milk is first poured through a strainer into a receiving vat. The strainer is home made, comprising several thicknesses of cheese cloth and wire, and when in use is attached with clothes pins to the rim of the receiving vat. This rests upon the ice-covered top of the aerator, so the all important cooling process begins at once.

From the vat the milk trickles in a hundred tiny streams over the cool surface of the aerator. Its temperature is thus reduced to 40 degrees F., at which point the bacteria are stunted and their growth retarded. The milk is then ready to be drawn into bottles.

This is done by the farmer's wife, who takes a shining bottle from the shelf, fills it, immediately inserts a sterilized pasteboard cap, the certificate is then drawn on, and the bottles placed in the shipping box. This also is tightly packed with ice, so that during the transit to New York the temperature of the milk remains at the safety point, and the milk delivered to the consumer as pure as when it came from the cow.—*The Sun—Hoard's Dairyman*.

Certified Milk.—In some of the large cities of this country the physicians and milk producers working in unison have entered into an arrangement for the production of milk which the consumers may know is of the required degree of excellence. The arrangement usually consists of a commission, which, co-operating with the dairyman, provides for veterinary, chemical, and

bacteriological inspections of the dairy and the milk supply. The following circular relating to certified milk issued by the milk commission of the Medical Society of the County of New York states the requirements of that commission and indicates the nature of the required sanitary precautions.*

The commission appointed by the Medical Society of the County of New York to aid in improving the milk supply of New York City invites the co-operation of the milk-dealers and farmers in attaining that end. The sale of pure milk is of advantage to those furnishing it, as well as to those who use it. The commission has undertaken to assist both consumer and producer by fixing a standard of cleanliness and quality to which it can certify, and by giving information concerning the measures needful for obtaining that degree of purity.

The most practicable standard for the estimation of cleanliness in the handling and care of milk is its relative freedom from bacteria. The commission has tentatively fixed upon a maximum of 30,000 germs of all kinds per cubic centimeter of milk, which must not be exceeded in order to obtain the indorsement of the commission. This standard must be attained solely by measures directed toward scrupulous cleanliness, proper cooling, and prompt delivery. The milk certified by the commission must contain not less than four per cent of butter fat, on the average, and have all other characteristics of pure, wholesome milk.

In order that dealers who incur the expense and take the precautions necessary to furnish a truly clean and wholesome milk may have some suitable means of bringing these facts before the public, the commission offers them the right to use caps on their milk jars stamped with the words, "Certified by the Commission of the Medical Society of the County of New York." The dealers are given the right to use these certificates when their milk is obtained under the conditions required by the commission and conforms to its standards.

The required conditions are as follows:

1. The Barnyard.—The barnyard should be free from manure and well drained, so that it may not harbor stagnant water. The manure which collects each day should not be piled close to the barn, but should be taken several hundred feet away. If

* Chapin. *Theory and Practice of Infant Feeding*. 1902.

these rules are observed not only will the barnyard be free from objectionable smell, which is always an injury to the milk, but the number of flies in summer will be considerably diminished. These flies in themselves are an element of danger, for they are fond of both filth and milk, and are liable to get into the milk after having soiled their bodies and legs in recently visited filth, thus carrying it into the milk. Flies also irritate cows, and by making them nervous reduce the amount of their milk.

2. The Stable.—In the stable the principles of cleanliness must be strictly observed. The room in which the cows are milked should have no storage loft above it; where this is not feasible, the floor of the loft should be tight, to prevent the sifting of dust into the stable beneath. The stables should be well ventilated, lighted, and drained, and should have tight floors, preferably of cement. They should be whitewashed inside at least twice a year, and the air should always be fresh and without bad odor. A sufficient number of lanterns should be provided to enable the necessary work to be properly done during dark hours. There should be an adequate water supply and the necessary wash-basins, soap, and towels. The manure should be removed from the stalls twice daily, except when the cows are outside in the fields the entire time between the morning and afternoon milkings. The manure gutter must be kept in a sanitary condition, and all sweeping and cleaning must be finished at least twenty minutes before milking, so that at that time the air may be free from dust.

3. Water Supply.—The whole premises used for dairy purposes, as well as the barn, must have a supply of water absolutely free from any danger of pollution with animal matter, and sufficiently abundant for all purposes and easy of access.

4. The Cows.—The cows should be examined at least twice a year by a skilled veterinarian. Any animal suspected of being in bad health must be promptly removed from the herd and her milk rejected. Never add an animal to the herd until it has been tested with tuberculin and it is certain that it is free from disease. Do not allow the cows to be excited by hard driving, abuse, loud talking, or any unnecessary disturbance. Do not allow any strongly flavored food, like garlic, which will affect the flavor of the milk, to be eaten by the cows.

Groom the entire body of the cow daily. Before each milking wipe the udder with a clean damp cloth, and when necessary wash it with soap and clean water and wipe it dry with a clean towel. Never leave the udder wet, and be sure the water and towel used are clean. If the hair in the region of the udder is long and not easily kept clean, it should be clipped. The cows must not be allowed to lie down after being cleaned for milking until the milking is finished. A chain or rope must be stretched under the neck to prevent this.

All milk from cows sixty days before and ten days after calving must be rejected.

5. The Milkers.—The milker should be personally clean. He should neither have nor come in contact with any contagious disease while employed in milking or handling milk. In case of any illness in the person or family of any employee in the dairy, such employee must absent himself from the dairy until a physician certifies that it is safe for him to return.

Before milking, the hands should be thoroughly washed in warm water with soap and a nail brush and well dried with a clean towel. On no account should the hands be wet during the milking.

The milking should be done regularly at the same hour morning and evening, and in a quiet, thorough manner. Light-colored washable outer garments should be worn during milking. They should be clean and dry, and when not in use for this purpose should be kept in a clean place protected from dust. Milking stools must be kept clean. Iron stools, painted white, are recommended.

6. Helpers other than Milkers.—All persons engaged in the stable and dairy should be reliable and intelligent. Children under twelve years should not be allowed in the stable during milking, since in their ignorance they may do harm, and from their liability to contagious diseases they are more apt than older persons to transmit them through the milk.

7. Small Animals.—Cats and dogs must be excluded from the stables during the time of milking.

8. The Milk.—The first few streams from each teat should be discarded, in order to free the milk ducts from milk that has remained in them for some time and in which bacteria are sure to have multiplied greatly. If in any milking a part of the milk

is bloody or stringy or unnatural in appearance, the whole quantity of milk yielded by that animal must be rejected. If any accident occurs by which the milk in a pail becomes dirty, do not try to remove the dirt by straining, but reject all the milk and cleanse the pail. The milk pails used should have an opening not exceeding eight inches in diameter.

Remove the milk of each cow from the stable immediately after it is obtained to a clean room and strain it through a sterilized strainer.

The rapid cooling of milk is a matter of great importance. The milk should be cooled to 45° within one hour. Aeration of pure milk beyond that obtained in milking is unnecessary.

All dairy utensils, including bottles, must be thoroughly cleansed and sterilized. This can be done by first thoroughly rinsing in warm water, then washing with a brush and soap or other alkaline cleansing material and hot water, and thoroughly rinsing. After this cleansing, they should be sterilized with boiling water or steam and then kept inverted in a place free from dust.

9. The Dairy.—The room or rooms where the bottles, milk pails, strainers, and other utensils are cleaned and sterilized should be separated somewhat from the house, or when this is impossible have at least a separate entrance, and be used only for dairy purposes, so as to lessen the danger of transmitting through the milk contagious diseases which may occur in the home.

Bottles, after filling, must be closed with sterilized discs, and capped so as to keep all dirt and dust from the inner surface of the neck and the mouth of the bottle.

10. Examination of the Milk and Dairy Inspection.—In order that the dealers and the commission may be kept informed of the character of the milk, specimens taken at random from the day's supply must be sent weekly to the Research Laboratory of the Health Department, where examinations will be made by experts for the commission; the Health Department having given the use of its laboratories for this purpose.

The commission reserves to itself the right to make inspections of certified farms at any time and to take specimens of milk for examination. It also reserves the right to change its standards

in any reasonable manner upon due notice being given to the dealers.

Good results of Right Methods.—The results of cleanliness and cold was illustrated in a striking manner at the Paris Exposition of 1900 in the exhibit of American dairy products, in charge of Maj. Alvord, chief of the Dairy Division of the United State Department of Agriculture. To this exhibit there were shipped at regular intervals fresh milk and cream from farms in Illinois, New Jersey, and New York. In his report the major said:

"Foreign visitors and expert milk dealers on the jury were hard to convince that nothing but 'cleanliness and cold' were used to preserve these products.....When finally satisfied as to the honesty of these exhibits, all three were promptly awarded gold medals.....No other country except France attempted to show natural milk and cream. The French exhibits of natural milk and cream were in striking contrast with those from the United States. At the July show there was not a single one of these local exhibits which was fit to use the day after reaching the grounds, and even in the moderate temperature of the May and September shows, the French products were all sour on the second or third day. But there were the natural products from America, just as they would be delivered to consumers in New York and Chicago, still perfectly sweet, a fortnight after being bottled and after a summer journey of three thousand or four thousand miles."

Dr. Sherman, of Fresno, California, speaking of the keeping qualities of clean cooled milk says: "Milk from our own dairy has been carried on a camping trip, during the heat of summer, and remained sweet for four and one-half days, carried in a camp wagon."

Cream from the creamery of Mr. Pope, of Manchester, in this State, kept six days without turning in the heat of midsummer, in an ordinary cellar but near no ice.

The Extra Cost of Sanitary Milk.—It costs more to produce milk suitable for infant feeding than it does to produce a grade of milk in which there is no loss from the rejection of milk from which colostrum corpuscles have not yet disappeared, that from cows with inflammation of the udder, or from other causes which render the milk not just right. It costs rather more to feed cows

and care for them just as they should be fed and cared for to produce first class milk. It costs more to produce it, and those who require good milk should understand this and be willing to pay a fair compensation for it. It would not, however, require the expenditure of a good part of the daily earnings of the ordinary laborer to provide good "certified" milk for his baby, as it would to feed the child with the products of the milk laboratories of the larger cities. Though costing a few cents extra per quart, the providing of infants with the very best of milk is in the line of true economy—the saving of money as well as of babies.

SOME OBSERVATIONS IN REGARD TO SMALLPOX.*

BY

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The outbreak of smallpox all over the country during the past four years has been the cause of a great deal of controversy among physicians; many failing to recognize the true nature of the disease made diagnoses of varicella, eczema, vaccinia, Cuban itch, pseudo smallpox, Philippine rash, etc., and consequently observed none of the necessary precautions for preventing the spread of the malady.

The term varioloid is generally used to denote a mild form of smallpox, modified by vaccination. We sometimes see just as mild forms of the disease in persons who have not been vaccinated as in those who have, and it is my opinion that all cases should be called smallpox or variola, as otherwise a wrong impression may be given to the public, many thinking that the cases are not true smallpox.

Fifteen or twenty years ago cases of smallpox were more or less typical in their objective characteristics, but in late years there have been so many irregular types seen that a correct diagnosis is, in many cases, extremely difficult.

While I was diagnostician of the department of health of the city of New York, and as such had occasion to observe more than 1,000 cases of the true disease, and an equal number of cases that were incorrectly reported as smallpox, although I thought that I ought to be able to recognize any true case of variola, all my observations brought me to the conclusion that it is often one of the diseases most difficult to diagnose, and that there are

* Reprinted from *American Medicine*, IV., 498. 1902.

instances in which it is simply impossible to make a decided diagnosis at any stage of the affection.

A large number of physicians never see smallpox, and the great majority of those who do see only a few cases, and so cannot act from knowledge gained by personal observation, but for diagnostic characters must rely entirely upon what others have written. This, so far as the irregular class of cases is concerned, is frequently very misleading.

For instance, in a recent article by a professor of dermatology, the statements are made that the prodromal symptoms are always present for three days or more; that the temperature falls to normal within a few hours after the appearance of the eruption and that the lesions are deep-seated; also, that varicella rarely occurs in adults, the author having seen only one case after puberty.

Another article on the differential diagnosis between smallpox and varicella, published this year by a well-known authority, says that fever in smallpox lasts three days, even in mild cases, but in varicella it is slight, if present at all; that the eruption in variola is a firm, solid, reddish elevation, which continues so for at least 24 hours, and does not appear in successive crops; that the palm is a site peculiar to variola, and that for this reason its involvement is almost absolutely diagnostic of that disease, as it is observed most rarely in chickenpox, and that the latter disease is very exceptional in adults. The statement is also made that until the last three years there has seldom been any controversy about the diagnosis of smallpox. Although more of these irregular cases have been seen during that time a comparatively large number have been observed in New York during the last ten years.

It is not strange, therefore, that health officers have labored under great difficulties in combating the disease, as many of the cases were so mild that they were not seen by a physician, and often when they were seen an incorrect diagnosis was made and the nature of the affection recognized only after others had contracted the disease.

A short time ago the health officer of one of the neighboring cities called to consult me in regard to some eruptive cases he had quarantined. He said his assistant and a number of prominent physicians were positive that they were cases of varicella. Many

of the patients had slight prodromal symptoms, followed the next day or so by papules appearing on the face and gradually extending over the body. The eruption was, as a rule, discrete, and the papules sharply limited, pinhead in size and larger; these were quickly converted into vesicles, many of which were superficial and about the size of a small pea; with the vesicles were new papules appearing; many of the lesions became pustular; none of the patients were very sick, and the disease lasted about two weeks, leaving few scars.

The diagnosis of varicella was made by these physicians on account of the lesions being so superficial; the eruption appearing in successive crops, and the cases all being so mild; some of them in children who had never been vaccinated, and others in adults who had not been vaccinated since infancy.

I told the health officer that he was unquestionably dealing with an irregular type of smallpox. My diagnosis was made on finding the prodromal symptoms lasting a day or more before the eruption came; the lesions appearing first as distinct papules, changing to vesicles and pustules and being seen first on the face and gradually extending over the body. If they had been cases of chickenpox the prodromal symptoms would not have been so marked, and the lesions would have appeared as vesicles instead of papules, and most of them would have been seen first on the back or on the body instead of on the face.

During the recent outbreak, even among unvaccinated persons, the disease has been so mild in character and so peculiar in the appearance of lesions, so modified, one might say, and the mortality so small, that in many cases physicians have insisted that the disease was not smallpox, and maintained the truth of their diagnosis, even after experts had pronounced it to be such. Even in Europe there has been a great deal of doubt expressed as to the correctness of the diagnosis of smallpox in many of the cases reported as such in the United States.

It is claimed by some that the disease has become less virulent; that this is due to a certain amount of immunity acquired through vaccination, not only in the person, but through past generations. If this view were correct, we should expect this modified form to have been observed before the days of vaccination, when smallpox was such a frequent disease. Another objection to this view is that the mild type of the disease has been so universal all over

the United States, even in localities where little attention is paid to vaccination, but it has not been seen in Europe, where vaccination is more systematically performed.

Contrary to the general rule in infectious diseases giving immunity, as in scarlatina, etc., these mild cases have been seen at the outbreak, but after the disease has lasted a year or so in any locality the type of the affection has become more severe and the mortality larger, although a certain number of the mild cases may continue to appear. This view, therefore, can scarcely be accepted as accounting for the peculiarities of the cases observed.

Another theory has been advanced, that there is a disease between smallpox and varicella which has not yet been recognized. A fatal objection to this view is that typical cases of smallpox may be contracted from these cases, and persons who are protected by vaccination from smallpox are immune to this so-called intermediate disease. In a number of instances cases of hemorrhagic smallpox have been contracted from these mild cases.

In New York, patients having these irregular cases are put in the wards with those showing typical and severe cases, yet they never contract the disease, which they would if they were not suffering from smallpox.

In New York City varicella is always prevalent, but there are months at a time when there are no cases of smallpox, and during this period these irregular cases are never seen.

Some time ago a man in the city had a slight eruption and remained away from business only two or three days. His physician diagnosed it as chickenpox. During the next five weeks other members of the family contracted the disease and it was considered that they all had chickenpox, until a younger child died from confluent smallpox. A diagnostician of the department of health visited the house and found a servant ill with smallpox, the other patients having recovered. There had been no other cases of variola in the neighborhood, but, undoubtedly, they had all been cases of that disease.

Smallpox is one of the most contagious of the exanthems and few persons exposed to the disease escape it, unless protected by a previous attack or by vaccination. An attack of smallpox gives immunity for a longer period than a single vaccination does, but my experience has been that a recent successful vaccination more surely gives immunity than an attack of smallpox of some time past. I have seen persons who have had the disease

two and three times, but never one who contracted it after a recent successful vaccination. None of the diagnosticians of the Department of Health of the city of New York or nurses of the Smallpox Hospital has ever contracted the disease, and they are protected only by recent vaccinations. To obtain complete immunity from the disease for life it is usually necessary for the person to be successfully vaccinated several times. The correct plan, I believe, is to vaccinate a child at the age of three months, again at five or six years, a third time at the age of puberty and once or twice during adult life. In some persons the immunity lasts much longer than in others.

Although glycerinized virus is in every respect preferable to humanized lymph the latter gives longer immunity.

If a child is liable to be exposed to smallpox, I would vaccinate it as soon as it is born, although it is often difficult to obtain a successful result so early in life, and it may have to be repeated. I have seen several children who contracted smallpox before they were a month old.

I have vaccinated more than 100,000 persons, and have never yet failed to obtain a successful primary vaccination, although in a few instances I have had to vaccinate several times.

The contagion of smallpox is present in the exhalations and secretions, and especially in the crusts. During convalescence the scales, as a fine powder, are carried some distance. There is no danger of contagion during the period of incubation, and my experience has been that it is much less during the prodromal symptoms than after the eruption appears. In the general hospitals, where patients are carefully observed, and isolated on the first appearance of the eruption, we find that there is not much danger of contagion.

Although there is a difference of opinion, I do not think smallpox can be communicated by means of pus secreted from sinuses, boils, etc., after the patient has otherwise recovered from the disease. Dr. William H. Park, however, is conducting some experiments that will soon settle the question.

The period of incubation lasts from 7 to 21 days, although it is not often longer than 15, and 14 is the usual limit. Some time ago the rule of the Department of Health was to keep persons who had been exposed to the disease under surveillance for two weeks from the last exposure, unless they were immune by a

recent vaccination, but the disease developed in some instances after a longer period and it has been deemed advisable to extend the time to three weeks. It is not necessary, however, to keep a person under surveillance for more than 15 days after a successful vaccination.

About 15 years ago a vessel arrived at quarantine with smallpox on board. The diseased persons were removed to the hospital, the vessel disinfected, and the crew taken to Hoffman's Island, where they remained for 14 days, when, having shown no signs of the disease, they were discharged after having been successfully vaccinated. Three days later (17 days after the last exposure) one of the men applied at a police station for shelter, and on informing them that he had been on a smallpox ship, an ambulance surgeon was promptly called, who found an eruption on the man's leg and pronounced it smallpox. I found that he had been successfully vaccinated 13 or 14 days before, and the vaccination had run its regular course. He had no elevation of temperature and said that he felt perfectly well. On his legs was an old eruption of purpura haemorrhagica. On examining him carefully I found two or three vesicles on the fauces, and five or six small shot-like papules on his forehead, each about the size of a pinhead, and evidently of only a few hours' duration; in fact, he had not noticed them himself. There were no other lesions on the body. As they were fairly typical of smallpox, I thought it best to send him to the Reception Hospital for further observation. I saw him the following day, when there was no difficulty whatever in making a positive diagnosis. The lesions on his forehead had become vesicular, and there were a few typical papules scattered over the wrists and body. He had no other symptoms, nor did he have any during the time he was in the hospital. The lesions were very discrete and ran their course rapidly, so that he was discharged in 10 days.

I have seen several other cases in which the period of incubation was probably over 14 days, and there are cases on record in which it was 20 days.

The invasion is usually marked by a chill (often convulsions in children) intense headache and severe pain in the back and limbs. There may be delirium, and vomiting and nausea are often present. The temperature, as a rule, is high, and may reach 104° or 105° on the first day; pulse rapid and full; skin dry, and face flushed.

Usually the prodromal symptoms give some indication of the severity of the disease, but I have seen cases in which severe preliminary symptoms were followed by a very discrete eruption,

and again a confluent form in which there were very slight prodromata.

Before the true eruption comes, usually on the second day, a rash sometimes appears; this is either scarlatiniform, morbilliform or purpuric in appearance, and is most frequently seen in the milder cases, more often in men than in women. Its favorite locality is the inguinal region, next in frequency it is seen in the axilla, but it may also appear on the back and arms. As a rule, it vanishes with the appearance of the papules. The most common variety is the scarlatiniform. Its probable cause is a disturbance of the cutaneous vaso-motor system. Another form is the hemorrhagic, which appears earlier, often on the first day, and the eruption is very intense with petechias, and covers the body and extremities. Hemorrhages take place in the conjunctivas and various mucous membranes and persist after the papules appear, unless the patient dies in the meantime.

A case occurred in this city last year in which a man died before the appearance of any papules, and his physician diagnosed it as malignant scarlet fever. Fourteen days later two other members of the family developed smallpox, and subsequent investigation showed that the man had undoubtedly died from that disease.

Another case was that of a woman who died after two days' illness with a marked hemorrhagic eruption over the whole body, with hemorrhages from the uterus, bowels, kidneys and mucous membrane of the mouth. Careful inspection just before death showed three or four smallpox papules on the soles of the feet, but none on the rest of the body.

A short time ago a physician told me of what he considered the worst case of scarlet fever he had ever seen. I asked him if there were hemorrhages in the conjunctivas, and on his informing me that there were, I told him that it was probably a case of hemorrhagic smallpox. This it proved to be.

I have known a number of similar cases in which death took place before the appearance of the regular eruption, and no correct diagnosis was made until after other members of the family had developed smallpox. Sometimes the hemorrhages do not take place until the vesicles or pustules are formed, and the later this occurs the less unfavorable the prognosis. These are not true cases of hemorrhagic smallpox, although they are sometimes so designated.

In a typical case of variola the eruption appears on the third or fourth day as small red spots, which in a few hours become papular; the papules are elevated, indurated and seem shotty to the touch. It is usually seen first on the mucous membrane of the mouth, then on the forehead and wrists, then spreading over the face and arms, and gradually extending over the whole body, as a rule appearing first where there is the greatest supply of blood. The lesions have also been found in the larynx, esophagus, stomach and rectum.

With the appearance of the eruption the temperature generally falls, and the premonitory symptoms disappear, but sometimes they continue for several days. The papules increase in size, turn to vesicles with clear contents on the fifth or sixth day, and then become umbilicated. The eighth day the contents become yellowish in color, the shape of the pustules changes, becoming globular, and the umbilication disappears; there is an areola around the pustules, the face is swollen and the eyes may be closed; the edema is usually intense enough to cause considerable pain.

With the pustulation the fever and the general symptoms recur; these latter may be very severe. They subside after two or three days, although in some cases they persist for a week or more. The pustules begin to dry first on the face, following the course of the eruption. They break and crusts are formed, and it may be some time before they all disappear.

In confluent cases, which as a rule occur in persons who have never been vaccinated, the symptoms are more severe, and the lesions run together and coalesce. The face is swollen and has a flat appearance, so that often the patient cannot be recognized. The eruption may be confluent on the face, hands and feet, and discrete on the rest of the body. The severity of the disease can often be judged by the number of lesions on the face.

In mild or modified cases there may be only a few, if any, prodromal symptoms, the patient merely having a feeling of malaise; the eruption may perhaps be the first thing he notices, and this may be very slight and may run a very irregular course. The lesions may be very small and may dry in a few days, some of them not advancing beyond the papular stage; again, they may run a typical course until they become turbid, then there is a retrocession as in varicella. Some times the lesions are very superficial and become vesicles during the first 24 hours, appear-

ing first on the body instead of on the face. In a small number of mild cases hemorrhages take place in the pocks on the legs during the vesicular stage, and then the lesions abort. The hemorrhagic or confluent form is often contracted from the mildest cases.

The lightest case I have seen was in a boy of 6 years who was successfully vaccinated for the first time 12 days before, when his brother was removed to the hospital with smallpox. I saw him the day before the eruption appeared; he had no fever, felt perfectly well and there was nothing on the skin. Twenty-four hours later, although there was nothing to be seen in the mouth, he had two small papules on his right wrist and one on his forehead; these were shotty, elevated and firm. There was no elevation of temperature and he had no symptoms during the whole course of the disease. The next day I found six lesions on the face and wrists; these were vesicular and some of them were umbilicated. No other lesions appeared and all disappeared in seven days, leaving very superficial scars.

Another very mild case was that of a child of seven years, five years after a successful vaccination. There were no subjective symptoms, and about 20 superficial characteristic vesicles, similar to those in the other case, were scattered over the body. They all disappeared in ten days.

In both cases there was no difficulty in making a diagnosis, but the disease might not have been recognized if attention had not been called to it by the previous cases in the family.

I have never seen smallpox occurring within a shorter time after a successful vaccination, and Dr. William M. Welch, in a recent article, says that he has never seen it within five years. However, some cases have been reported, and although there may be a question as to the quality of the virus and whether the vaccination was successful, I think it safer to revaccinate persons who may be exposed to the disease, even if they have been vaccinated within five years.

A woman of 22, who had not been vaccinated since childhood, gave the history of having a slight headache for a few hours, but no other symptoms. The next day she noticed three or four papules on the face, followed by about 40 or 50 on the body and extremities, each about the size of the head of a pin, a few being larger. They quickly became vesicular, and a few were pustular; none of them were irregular in shape. The lesions were very superficial and the tops could be easily knocked off. The fourth day they commenced to dry down, most of the crusts

being no larger than the head of a pin; they all disappeared within ten days, leaving a very few superficial scars that were scarcely discernible.

The diagnosis was between smallpox and varicella, and that of smallpox was made on the fact of the eruption appearing first on the face, forming vesicles soon after, and later in turning into pustules; also that most of the lesions were very small and of about the same size, and that there were no large, irregular, flat lesions, such as are seen in varicella.

A woman, aged 25, vaccinated in infancy, had headache, slight fever and backache for three days, after which they disappeared; she then noticed a few small vesicles, pinhead in size, on the abdomen; these were followed by papules on the face and over the whole body. I saw her on the third day after the eruption. The lesions were vesicular, discrete, pinhead in size, and fairly superficial; many on the body and legs were slightly hemorrhagic and drying down, but they did not rupture. There were a few vesicles on the palms of the hands and soles of the feet, but no large or irregular lesions anywhere on the body. There was no pustulation or secondary fever, and the lesions disappeared in about two weeks. She was vaccinated on the first appearance of the eruption, but it was not successful.

Syphilis was excluded on the prodromal symptoms, on their disappearance on the coming of the eruption; on most of the lesions appearing as papules and becoming vesicles; on their short duration, and on the absence of marked grouping. Varicella was out of the question, also, on account of the prodromal symptoms; most of the lesions appearing as papules, all about the same size; and there being no large, flat, irregular lesions, such as are seen in varicella.

A diagnosis of smallpox was made on the prodromal symptoms; most of the lesions appearing as papules of about the same size, and being present on the palms and soles. My diagnosis was doubted until her brother was taken ill with semi-confluent smallpox two weeks later.

We find every gradation, both in the symptoms and in the character of the eruption, between such mild cases and the hemorrhagic and confluent forms.

Some years ago I saw a woman who was admitted into Bellevue Hospital for tonsillitis. The nurse said there was no eruption noticeable when the patient entered, but the next morning she observed some on the face and neck. I saw the patient about an hour later, and there were then a few small vesicles on the mucous membrane of the mouth, and about a dozen vesicles on the face and neck, all of them superficial and irregular in shape;

three or four of them had ruptured, forming crusts. The lesions were very similar to those in varicella, but as there was none on the back or body, I considered the case suspicious and had the patient isolated. She was seen again in the afternoon, when a number of characteristic smallpox papules had appeared, and she was sent to the smallpox hospital. I saw her there two days later, and the eruption was general, but apparently of the seventh day instead of the third. In this case only the first lesions were superficial, but in many cases seen during the past three years all the lesions have been superficial, and many flat and irregular in shape, and at no time have there been any typical classic lesions of smallpox.

These are the cases that are most difficult to diagnose, especially when the lesions, instead of appearing first on the face and extending over the body, come out in successive crops; so that we find papules, vesicles, pustules and crusts in the same area.

The first well-marked case of this character that I ever saw was in an Italian, about ten years ago, and I made the diagnosis of varicella. Several experts, who also saw the case, agreed with me. When I saw him first he had evidently been ill about ten days, but I could not obtain any reliable history. He had, scattered over the whole body, a discrete eruption, consisting mainly of rather superficial pustules about the size of a small pea, and crusts. There were also some vesicles and commencing papules. On the abdomen were papules, vesicles, pustules and crusts, and traces also showed where the crusts had been thrown off. Many of the lesions were fairly superficial, and the duration of most of them was only a few days. A short time after this several other members of the family developed smallpox; I changed my diagnosis, and he was sent to the hospital.

About the same time I saw a young man with a profuse eruption, covering the whole body; the lesions coming out in successive crops, so that there were papules, vesicles and pustules side by side. I made a diagnosis of varicella, and several experts, who had also seen the case, made the same diagnosis until his brother developed a typical case of smallpox.

In both cases I discarded the thought of smallpox on account of the polymorphous eruption. At that time, so far as I know, there had been no similar case reported, and all the authorities maintained that such a condition could not exist in smallpox. Since then I have seen a number of such cases, and they have also been observed by others. It is claimed by some that when a polymorphous eruption is present, it is a combination of smallpox and some other disease. In the cases I have seen all the lesions have been those of smallpox.

The following case shows a peculiar distribution of the lesions:

A man the second day of the eruption had only three or four papules on the face, and not more than a dozen on the chest and arms, while the back was thickly covered with them. With the exception of that on the back, the eruption remained discrete.

An interesting case was seen by one of the inspectors of the Health Department about 30 years ago, and I think it was never reported:

A woman nursed her husband, who was attended by Dr. Charles W. Packard, during an attack of confluent smallpox. She was pregnant and gave birth to a six months' fetus which had on the face and body pustules, apparently of the eighth day of smallpox. The mother had had no eruption nor any of the other symptoms except pain in the back, which was attributed to her condition.

I have never seen a similar case, but have observed several in which the disease had been contracted in utero and the mother had the eruption. Almost invariably the mother will abort, and I have seen a number of cases in which the child was born with the eruption, and others in which it developed a few days later. Also one or two cases in which the child was vaccinated at birth and escaped the disease.

The question is often asked whether it does any good to vaccinate after a person has been exposed to smallpox and probably contracted it. As a rule if the vaccination is performed the same day as exposure, and is successful, it will give immunity and the person will have no signs of smallpox. Vaccination a week later will have no effect on the disease, but two or three days after exposure, while it may not prevent it, will greatly modify the smallpox.

The vaccination runs its regular course until the eruption appears. If the areola is fully developed the disease is modified, but if it is not well marked there is no further advancement, and the vaccination quickly dries and has little if any effect on the course of the disease.

A patient presenting an interesting case of smallpox walked into Dr. A. R. Robinson's class at the Polyclinic a few weeks ago to be treated for a burn on the right side of the face, extending from the hair to the lower jaw. It was about $1\frac{1}{2}$ inches wide, one inch being rather deep, involving the true skin, the rest superficial, involving only the epidermis. He had other

lesions on the face and on the body, but these he did not consider to amount to anything; they had appeared the evening before. On the mucous membrane of the mouth were a number of well-defined vesicles. The part of the face not affected by the burn was thickly covered with papules about the size of a small pea, elevated, firm and shot-like in consistency. Similar lesions were on the wrists, body and palms of the hands. The area occupied by the superficial burn was thickly studded with a number of lesions, not elevated and apparently macules, but where the burn was deep there were no lesions. A few shotty papules could be felt under the skin on the legs. Besides the papules on the right side of the neck there were three large vesicles, irregular in shape, superficial and flat, resembling varicella. On the flexor surface of the right arm were four indurated, umbilicated vesicles, the size of a small pea. None of the lesions were 24 hours old.

Dr. Beery, resident physician at the Smallpox Hospital, reported a few days later that the whole face, with the exception of the area of the burn, was covered with a semiconfluent pustular eruption. On the superficially burned area the eruption was pustular, but not elevated, and dried down quickly. At no time were there any lesions on the deep portions.

This case is reported to show the behavior of the eruption on a recently burned skin.

A man of about 35 years who was vaccinated in infancy, gave a history of headache, with a temperature of 106° , which temperature became normal on the appearance of an eruption on his face and body. I saw him three days later. On his face were eight deep-seated pustules the size of a small pea. On the back, chest and arms were a large number of vesicles, varying in size from a pin-point to that of a small pea; all very superficial and some just appearing. These lesions were similar to those of varicella. On the back were also a few large, deep-seated pustules, due to a mixed infection and similar to those seen in a pustular syphilid. On the palms and soles were seven characteristic smallpox papules, also one on the back of the left hand, three on the wrists and a few on the legs. On these, and the lesions on the face, a diagnosis of smallpox was made. If they had not been present, it would have been impossible to have made a diagnosis from varicella.

I saw another patient of Dr. A. R. Robinson's, a man who had a pustular eruption from taking potassium iodid. The lesions on the face were similar to those I had seen in several cases of smallpox, and from them alone a differential diagnosis could not have been made. However, from the history and from examination of his body there was no difficulty in making a correct diagnosis.

To show how extremely difficult it sometimes is to make a correct diagnosis, I cite the case of a child, two years old, who had never been vaccinated. It differed in some respects from any case I had ever seen, and I said that a diagnosis between *variola corymbosa* and *varicella* could not be made.

The little patient was isolated and all precautions taken just as though it were a case of true smallpox. The eruption appeared first on the face as vesicles, pinhead in size; these dried down in two days, while similar lesions were appearing. Covering an area of about three by four inches in both groins were a large number of distinct vesicles, all about the size of a small pea, closely clustered together, fairly deep-seated, elevated, firm and umbilicated. Surrounding these clusters the skin was clear. On the back were a few vesicles, varying in size from a pin-point to that of a small pea, fairly superficial. A few discrete vesicles were present on the arms and legs, also on the palms and soles, and while these lesions were drying down a new crop appeared. At no time, however, were there any lesions on the chest or abdomen. The child died on the eighth day of the disease from edema of the glottis, and sepsis.

I saw the child again after death and noticed in the inguinal region and on the arms and legs a number of deep-seated pustules and crusts, similar to those in smallpox.

The character of the lesions on the face and back, and their manner of appearing, and their course, would favor a diagnosis of *varicella*, but the cause of death, the eruption in the groin, and the deep-seated lesions on the arms and legs made me incline toward a diagnosis of *variola*. All those exposed to danger from the child were immune from smallpox by vaccination, so that there were no secondary cases which might have aided in the diagnosis.

It is impossible to make a diagnosis before the eruption appears, except in the pure hemorrhagic form; but after a possible exposure to the disease, chill, fever, headache and severe pain in the lumbar region should make one suspicious and cautious as to diagnosis.

The eruption appears first on the mucous membrane of the mouth, although in many cases it may not be present; next on the forehead, at the margin of the hair, and on the wrists. One can often hasten its appearance on the body by a hot bath or by the application of poultices. In doubtful cases the fact that the patient had been recently and successfully vaccinated before

a possible exposure is of great value in excluding smallpox, and I think this fact is often not sufficiently considered.

Smallpox has been confounded with many diseases, but those most likely to give difficulty are varicella, measles, scarlet fever and syphilis.

Some physicians think that smallpox and varicella are not distinct diseases, but I believe there is no reason for such an opinion. A case of smallpox has never been known to be contracted from varicella, nor has the reverse ever been true.

Chickenpox cannot be transmitted by inoculation, as can smallpox. An attack of chickenpox does not give immunity from smallpox, nor does an attack of smallpox prevent a possible attack of chickenpox. Patients ill with smallpox have contracted varicella and *vice versa*. Patients with chickenpox can be successfully vaccinated. Lately we have vaccinated a large number of persons ill with smallpox, and in no case has the vaccination been successful.

In New York we always have varicella, but there are years when there are no cases of smallpox, and beside, vaccination gives no immunity from varicella.

Dr. William H. Park, of the Department of Health, has made a number of interesting experiments by inoculating monkeys with the secretions of the lesions from persons ill with smallpox, and also from those suffering from varicella. He obtained successful results in all cases of vaccination with virus from smallpox, but failed entirely when secretions from lesions of chickenpox were used. He is continuing his experiments, and we may soon have a valuable aid to diagnosis in doubtful cases. The objection to this method is that it sometimes requires three or four days to determine the result, and in a majority of the cases it would be possible in that time to make a diagnosis from the lesions of the patient.

In typical cases there should be no difficulty in making a diagnosis of smallpox or varicella, but there are cases of smallpox milder than the majority of cases of varicella, and on the other hand I have seen cases of varicella as severe as many cases of smallpox.

It is the unusual cases that are of especial interest to the physician, and in these a diagnosis is often most difficult, even for one who has had a large experience.

Most authorities give some diagnostic points, but many of them are misleading, as there is not a symptom or character of a lesion that is found in varicella that I have not seen in smallpox, and the only way a diagnosis can be made is by carefully considering the history, symptoms and character of the lesions, and even then several examinations may be necessary before a conclusion can be reached.

It is claimed by many that varicella does not occur in adults, or that cases are extremely rare, but this is of no value in making a diagnosis. I have seen a large number of such cases, and my experience has been that they are very often severe.

Some of the sever cases of varicella with deep-seated lesions are very difficult to diagnose.

I remember a most interesting case in which the patient was a physician, whom I saw through the courtesy of Dr. A. R. Robinson, who had made a diagnosis of varicella, principally from the fact that all the lesions commenced as vesicles and none as papules.

When I saw him on the second or third day of the eruption it would have been impossible for any one to have made a positive diagnosis from smallpox from seeing the lesions alone, without knowing their history. He gave a history of severe headache, pain in the lumbar region, and fever, with marked constitutional disturbance. The face and the whole body was covered with vesicles about the size of a split pea, many of them umbilicated and very few superficial. They were also present in the mouth and on the palms of the hands. A day or two later the diagnosis was simple. New vesicles were forming, the older ones were drying and the contents exuding, forming crusts. Besides these there were many new, flat, irregular lesions, especially on the back and chest.

A short time ago in consultation I saw a young lady of 18 years who was supposed to be suffering from a case of modified smallpox.

She gave the history of headache, pain in the back, slight constitutional symptoms, with a temperature of 101° , and on the following morning she noticed two lesions on the left side of her neck, followed a few hours later by others on her forehead, the eruption gradually extending over the body. She complained only of the discomfort caused by the lesions, and a sore throat. On the fauces were distinct vesicles the size of a small pea. The forehead and face showed about a dozen vesicles, shot-like in character, some slightly umbilicated, also a few lesions which appeared to be papules, but careful examina-

tion showed that they were commencing vesicles. These lesions were all about the same size, none of them irregular in shape or very superficial, and from them alone a diagnosis could not have been made of either smallpox or varicella. On the left side of the neck were two vesicles about three-eighths of an inch long by one-fourth of an inch wide, elevated, flat, fairly superficial, irregular in shape; the center had dried, forming a crust. The neck and chest was covered with a discrete eruption, consisting of vesicles, some pinhead in size and some larger, some deep and firm, others superficial, surrounded by an inflammatory area. A few lesions, superficial, slightly elevated, pin-point in size, were appearing; these quickly became larger and vesicular in character. The same condition existed on the arms, although there were very few lesions. The back was thickly covered with vesicles, some of them just appearing, varying from pin-point to that of a small pea in size. The majority were superficial but a few were deep and firm. Two vesicles were large, flat, and irregularly shaped. The lesions were just beginning to appear on the legs and there were very few small vesicles. There were no lesions on the palms of the hands or soles of the feet.

The diagnosis of varicella was made from the lesions on the back and chest, there being no distinct papules; the life duration of individual lesions being short, most of them superficial and irregular in size, the four large, irregularly-shaped lesions and fully developed vesicles; from the appearance of the new, superficial, pin-point vesicles, with slight inflammatory area; and from the fact that there was none on the palms and soles, and very few on the wrists.

Some claim that lesions are always present on the palms and soles in smallpox and never in chickenpox, but this is not correct. I have seen many cases of variola without lesions in those localities and a number of cases of varicella in which they were present there.

The first such case of varicella that I saw was years ago, in a boy of seven years, who was vaccinated in infancy.

He had severe prodromal symptoms, delirium and a temperature of 104° , followed 24 hours later by an eruption that was characteristic of varicella. There were vesicles in the mouth and lesions on the palms of the hands and soles of the feet, but there was no doubt as to the diagnosis.

The following points will aid in a differential diagnosis between a classical case of smallpox and varicella, as these diseases usually appear. In the unusual varieties there is great variation in the symptoms, and not one of them alone can be relied upon.

In smallpox the invasion is usually more severe and lasts three or four days, while in varicella the eruption appears on the first day, and there is no secondary fever. In some cases of smallpox the invasion is not noticed, or does not last over 24 hours, and there may be no secondary fever.

In smallpox the eruption appears first on the mucous membrane of the mouth, then on the forehead and wrists, while in varicella, although it may be present in the mouth, it is seen first on the shoulder and chest. In smallpox it is on the exposed parts, while in varicella, on the parts covered. However it may be seen on other localities in both diseases.

In smallpox the temperature falls with the appearance of the eruption, while in varicella it rises 1° to 2° while the eruption develops. It may, however, continue in smallpox.

In smallpox the lesions are more uniform, and are deeply seated, while in varicella they are superficial, flat and irregular in shape.

They may, however, be superficial in smallpox and deep-seated in varicella, but in the latter it is very rare not to find some large, irregular lesions, distinctly characteristic.

In smallpox the eruption commences as small papules, not usually becoming vesicles before the second day, while in varicella they appear as macules, becoming vesicles in a few hours, and are almost never shot-like, except occasionally on the palms of the hands and soles of the feet, locations where they are not commonly seen.

The first lesions in smallpox may be vesicles or they may become vesicles in a few hours. By carefully examining the patient, however, there can usually be found some papules in the early stage of the disease which will greatly aid in the diagnosis.

In smallpox, the vesicles, as a rule, have indurated bases, while in varicella they are not generally in the true skin, but are superficial, can be easily brushed off, and collapse early.

Although one may find a few lesions umbilicated in varicella, it is not as universal as in smallpox.

In smallpox, pustules generally remain whole for several days, keeping their form, while in varicella they become flattened and break in two or three days. The secretion in varicella is more transparent, and the pustules are composed of a single cell, while in smallpox they are made up of several little cells.

In smallpox the lesions, as a rule, appear in a regular course over the whole body, while in varicella they come out in successive crops.

Few scars result in varicella, and the duration of the disease is commonly much shorter than in smallpox.

In measles, the catarrhal symptoms are a great aid in diagnosis. The fever is not so high in the beginning, but gradually increases, reaching its height while the eruption, which usually appears on the fourth day, is spreading over the body; then the temperature becomes normal. There is not the same rapid fall of temperature that there is with the appearance of the eruption in smallpox. The lesions spread over the body more rapidly, are larger, more superficial and crescentic, and do not have the shotty character and never become vesicular nor pustular.

In the morbilliform rash of smallpox the eruption is less elevated than in measles, and disappears on pressure. The eruption is usually found in the groin or axilla, and the papular eruption soon appears.

The only cases of smallpox that would be mistaken for scarlet fever are the hemorrhagic, and those in which the initial scarlatiniform rash is present. In the hemorrhagic form the constitutional symptoms are more severe than in scarlatina; the eruption does not disappear on pressure, and is of a more intense red color, which, once seen, will not be forgotten.

Hemorrhages in the conjunctivas should exclude scarlet fever. The characteristic tongue and throat symptoms of scarlet fever are absent. If the patient does not die before the appearance of the papular eruption, this should make the diagnosis easy.

In many cases of hemorrhagic smallpox the eruption, instead of being papular, appears first as superficial vesicles, rather flat and flabby, and resembling those of varicella.

In cases in which there is the initial scarlatiniform eruption, it usually appears in the groin or axilla, while in scarlet fever it appears first on the neck and chest, and then spreads over the whole body. There are few, if any, anginal symptoms, and the characteristic tongue of scarlet fever and swelling of the lymphatic glands of the neck are not present. The appearance of the papules would decide the case when there might be any doubt. Some claim that it is more probably smallpox if the patient is an adult, but I do not consider this of any value in

making a diagnosis, although the larger number of cases of scarlet fever do occur in children.

A pustular syphilid is the form of syphilis most often confounded with smallpox, but the history of the case and the character of the eruption should seldom leave any doubt as to the correct diagnosis in the minds of those familiar with the disease.

In syphilis there may be some pain and fever, but these do not disappear with the appearance of the eruption, as in smallpox. The lesions are grouped and come out in successive crops, and are not as uniform in size, neither are they as often seen on the palms of the hands and the soles of the feet. They do not run the course of the lesions in smallpox, and there are usually papules with vesicopustular tops, instead of true vesicles or pustules.

I have seen cases of acne and impetigo contagiosa that had been reported as smallpox, but here the lesions were principally limited to the face; there were very few, if any, on other parts of the body. They are simply local conditions, without constitutional disturbances. Careful examination of the patient should leave no doubt as to the exclusion of smallpox.

Typhus fever, typhoid fever, cerebro-spinal meningitis and influenza have also been mistaken for smallpox, but the non-appearance of the characteristic eruption should exclude the latter disease.

I have seen persons suffering at the same time with smallpox and scarlet fever; or with smallpox and measles; or smallpox and syphilis, but usually the patient was convalescing from one disease when the other developed.

I saw a man with a marked pustular syphilid and smallpox, and when the latter disease was in the pustular stage it might easily have been overlooked.

In conclusion, I can only repeat that each case must be carefully studied in regard to its history, its symptoms and its lesions; the character and life duration of the lesions, individually and collectively, must be taken into consideration, and even then in many cases, and although backed up by a large experience, one may fail in making a correct diagnosis.

INDEX.

	PAGE
Albumin water	225
Artificial feeding as an aid to nursing	240
Bacteria in milk.....	265
Bacterial infection, sources of.....	266
stables and stalls.....	266
the cow	267
the milker and the milking.....	267
Bangor, smallpox in.....	14
Barley water	220
Bath, smallpox in.....	21
Beef juice	254
Bovine Tuberculosis	88
Cereal gruels	220
Certified milk	274
Chickenpox	87
Colostrum	261
Committees	1
Condensed milk	228
Corpses, transportation of.....	2
Correspondence, subjects of.....	35
Cows, breeds of.....	256
diseases of	259
feed and care of.....	256
gargety	260
spayed	264
Cow's milk, disadvantages and dangers in feeding.....	182
Dairy, A Model.....	272
Destruction of property.....	43, 44
Dexter, smallpox in.....	8
Dextrinized gruels	224
Dietitic treatment of sick babies.....	233
Diluents—The Cereal Question.....	201
Diphtheria	71
antitoxin	40
use of	71
Diseases of Animals.....	88
Disinfect, who shall?.....	54

	PAGE
Disinfection	41, 54
cistern	57
formaldehyde	55
formaldehyde spray	55
fur coat	59
houses	61
inquiry about	39
letters	60
rooms	59
scarlet fever	80, 81
school-books	58
schoolhouse	56, 61
school-room	58
smallpox	69, 70
typhoid fever	62, 82, 83, 84
Disinterment	92
Feeding bottles	217
Flour ball	255
Food, quantity of	218
Fort Point, smallpox at	14
Galvanized iron pipe	91
Gargety cows	260
Glanders	88, 89
disinfection of	89
Greenville, smallpox in	19
Hog cholera	88
Hominy grits	255
Houlton and border towns, danger in	21
Human milk as an aid to artificial feeding	242
Infant feeding	181
Junket	253
and egg	254
Laboratory work, inquiries about	35
Lewiston, smallpox in	10
Library, additions to the	107
Lime water	194
Local boards of health, abstracts of reports from	115
authority of	79
organization and records of	38
pay of	40
powers and duties of	38
Lowelltown, smallpox danger in	11
Measles	85
in a boarding-house	85
quarantine of	85, 86
Meat broths	254
Members of state board	1
Membraneous croup and disinfection	74

	PAGE
Milk aeration	270
albumin	188
alkalinity	193
bacteria in	265
bottles and cans.....	271
certified	274
cooling	271
fat	189
for infant feeding, production of.....	256
formulas	210
home modification of	206
household care of.....	215
mineral matter	192
mixing	215
modification of	186
pasteurization of	198
peptonized	227
proteids	186
raw versus heated	194
right methods, good results of.....	279
sanitary, the extra cost of.....	279
straining	270
sugar	189
utensils, care of.....	217, 269
Mixed feeding	240
Monson, smallpox in	18
Mother's milk, improvement of.....	244
Nuisances	48, 50
fish as a fertilizer.....	47
fish offal	48
in school	51
personal uncleanliness	51
sewerage system needed.....	52, 53, 54
New circulars, No. 71	95
No. 67	100
Oat jelly	255
Oatmeal water	221
Ovulation	262
Pasteurization, methods of.....	200
Peptonized milk	227
Percentage feeding	205
Physicians' reports, acceptance of.....	42
Portland, smallpox in.....	32
Postmasters, public health duties of.....	93
Quarantine	42, 45, 46, 47, 67
and furnishing help	75
breaking	40
of measles	86

	PAGE
Quarantine, period of in diphtheria.....	74
in scarlet fever.....	76
length of	79, 80
Rice milk	254
pudding	254
water	221
Sanatorium for consumptives.....	3
inquiries about	65, 66
treatment, where is it available?.....	62
Scarlet fever	48, 76
disputed diagnosis	81
in a school.....	78
outbreak, treatment of.....	77
quarantine in	76
Schools, inspection of.....	64
and churches, closure of.....	43
Scraped beef or beef pulp.....	254
Sheep, disease of.....	90
Ship disinfection, memoranda relating to.....	16
Sick babies, dietitic treatment of.....	233
Smallpox in 1901.....	7
and vaccination	67
in paper mills.....	67
on management of outbreaks.....	95
some observations in regard to.....	281
Special mixtures	220
papers	179
preparations	253
Top milk, how to remove the.....	215
Tuberculosis and sanatorium treatment.....	62
Typhoid fever	82
disinfection in	82, 83, 84
Vaccination	68
technique of	100
Van Buren, smallpox in.....	9
Water analysis	103
wanted	37, 38
Water and water supplies.....	91
Waterville, smallpox in.....	17
Weaning	247
diet after	248
Weighing the baby	219
Wheat gruel	221
Whey and whey mixtures.....	221
preparation of	223
Whooping-cough, sanitary treatment of.....	87
Yolk of egg and dextrinized gruel.....	253



